USING INNOVATIVE KNOWLEDGE MANAGEMENT TOOLS
FOR INFORMATION TECHNOLOGY DEVELOPMENT,
ACQUISITION, AND INTEGRATION
IN THE UNITED STATES ARMY

A thesis presented to the Faculty of the US Army
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MASTER OF MILITARY ART AND SCIENCE
Strategy

by

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The purpose of this thesis is to determine whether or not the Army is effectively and adequately employing innovative (IP-based) knowledge management (KM) tools to manage the knowledge of information technology (IT) development, acquisition, and integration. A world of unmanaged IT information is available to the military from various commercial and government sources that could improve its IT requirements analysis, efficiency of acquisition, and stewardship of taxpayer dollars in this age of rapidly changing technologies. This important issue is a leadership challenge for all officers to effectively and adequately employ KM to exploit synergies, gain efficiencies, and economies of scale that ultimately save taxpayer dollars and lives

This study is an investigation into the tacit and explicit knowledge of IT that the Army offers for IT development, acquisition, and integration. Case studies of the two current innovative Army KM systems and two potential non-DoD KM models were conducted. These KM systems are: the Battle Command Knowledge System (BCKS), the Center for Army Lessons Learned (CALL), Amazon.com, and BaseOps.net. In addition to these four formal case, seven more Army and Department of Defense (DoD) IT acquisition and KM organizations are investigated for their role and responsibility in tax stewardship, requirements development, and acquisition efficiencies.

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ABSTRACT

USING INNOVATIVE KNOWLEDGE MANAGEMENT TOOLS FOR INFORMATION TECHNOLOGY DEVELOPMENT, ACQUISITION, AND INTEGRATION IN THE UNITED STATES ARMY, by Major Dan Williams, 149 pages.

The purpose of this thesis is to determine whether or not the Army is effectively and adequately employing innovative (IP-based) knowledge management (KM) tools to manage the knowledge of information technology (IT) development, acquisition, and integration. A world of unmanaged IT information is available to the military from various commercial and government sources that could improve its IT requirements analysis, efficiency of acquisition, and stewardship of taxpayer dollars in this age of rapidly changing technologies. This important issue is a leadership challenge for all officers to effectively and adequately employ KM to exploit synergies, gain efficiencies, and economies of scale that ultimately save taxpayer dollars and lives

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ACKNOWLEDGMENTS

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ACRONYMS

ACAT   Acquisition Category

ASCP   Army Small Computer Program

BCKS   Battle Command Knowledge System

CALL   Center for Army Lessons Learned

COE   Contemporary Operating Environment

COTS   Commercial Off the Shelf

DoD   Department of Defense

DOTMLPF   Doctrine, Organization, Training, Materiel, Leadership and Education,
            Personnel and Facilities

GIG   Global Information Grid

GCN   Government Computer News

GOTS   Government Off the Shelf

GPS   Global Positioning System

IEEE   Institute of Electrical and Electronics Engineers

IT   Information Technology

ISSP   Information Systems Security Program

ISSPA   Information Systems Security Program Application

JTRS   Joint Tactical Radio System

KI   Knowledge Integration

KM   Knowledge Management

LIN   Line Item Number

MIC   Military Industrial Complex

NETCOM   US Army Network Technology Enterprise Command

PBUSE   Property Book Unit Supply Enhanced

QDR   Quadrennial Defense Review Report

RFP   Request for Proposal

SDR   Software Defined Radio

SAMS-E   Standard Army Maintenance System – Enhanced

SARSS   Standard Army Retail Supply System

SLAMIS   SSN-LIN Automated Management and Integrating System

WiMAX   Wireless Microwave Access Exchange

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CHAPTER 1

INTRODUCTION

> Just as we must transform America's military capability to meet changing threats, we must transform the way the Department works and what it works on. . . . Successful modern businesses are leaner and less hierarchical than ever before. They reward innovation and they share information. They have to be nimble in the face of rapid change or they die. (2001, 2)
>
> Donald H. Rumsfeld, Office of the Secretary of Defense

<u>Background</u>

Four centuries ago, English statesman-philosopher Francis Bacon wrote that knowledge is power (Nye 2007, 233); however, simply having the knowledge is not exploiting the true value of it. The fundamental goal of knowledge management (KM) is to increase the organization's ability to learn and apply that knowledge. It is not simply management of the knowledge, but the management of the organization with a particular emphasis of knowledge (Wissensmanagment Forum 2004, 5). The commercial world has known for years that KM is a major enabler of enterprise performance. Every request for proposal (RFP) a corporation submits to the government includes a section on the contractor's past performance qualifications and corporations spend a lot of money maintaining that intellectual capital. KM has recently become widely known as the new factor of production (ijm.cgpublisher.com 2007). This emphasis on knowledge to increase the ability to learn may take several forms, such as operations, logistics, innovation, or acquisition. "The Department of Defenses (DoD) goal is to capture, integrate and use organizational knowledge to gain an advantage over the enemy. The

department is using KM to address, in Rumsfeld-speak, the problem of unknown knowns--information that the DoD does not know that it has" (Slabodkin 2006, 1). The Army has taken some innovative steps to become a KM leader in the DoD, but there are significant shortcomings in the KM of information technology acquisition and requirements development. Throughout the remainder of this thesis, use of the word 'Army' includes the DoD-wide KM and acquisition programs relevant to the Army.

The Army has been leading the charge within the DoD to become a knowledge-centric organization since former Secretary Rumsfeld started implementing KM into its transformation process in 2001. The most recent example of the Army's progress is the implementation of the Battle Command Knowledge System (BCKS). BCKS was born out of the innovation of the two Army Majors Nate Allen and Tony Burgess, who started CompanyCommander.com and PlatoonLeader.org in 2000. These officers recognized the need for soldiers to share critical knowledge that is not available in the Army's aging doctrine and can only be obtained through real-life operational experiences (Slabodkin 2006, 2).

The purpose of these websites is to engage company-level leaders worldwide in a conversation about learning and building combat-ready teams and quickly adapting to the rapidly changing situations. The Army recognized the need to incorporate these knowledge networks because they were so heavily utilized and yet privately funded and maintained by these two Army majors. So in 2002, the Army began providing server space and maintenance support to these websites and then hired Triple-I to develop and implement BCKS in 2004. Ron Dysvick, president and chief executive officer of Triple-I says, "BCKS is about learning from current activity . . . and the rest of the organization

can likewise learn both across stovepipes and up the chain of command for strategic purposes" (Slabodkin 2006, 3). BCKS' director, Army Colonel Jim Galvin, said, "BCKS connects information and the warfighters who need to use it" (Slabodkin 2006, 3). This transition is a perfect example of what needs to be happening in the Army and DoD for information technology (IT) development, acquisition, and support. The warfighters' requirements are increasingly including the latest IT, which can be very expensive to buy, difficult to maintain, and a challenge to implement. The bottom-up and top-down phenomenon of KM tools affords a number of efficiencies, but the challenge is how to structure them accordingly.

Any soldier who has been to fight in the war on terror can verify that soldiers, units, and commands alike are buying any IT equipment they can use to be more effective--everything from police scanners to commercial satellite communications modems and air time contracts. The pervasive acquisition of IT at every echelon of today's Army has evaded the Army's requirements analysis system, the fiscal accountability of equipment, and the enduring lessons learned that will serve follow-on forces and institutional knowledge in the contemporary operating environment (COE). While the Army has made recent efforts in KM of operations and tactics, the vast benefits of KM for IT acquisition and requirements development have yet to be realized. Near real-time KM affords immediate and enduring fiscal, logistical, and tactical benefits at all levels of operation to the Army and DoD, including: developmental cost and time savings, economies of scale, timely lessons learned, product support, and requirements development. One recent Naval Postgraduate School thesis recommends that the DoD develop and adopt a next evolution eProcurement system. This system would, among

other things, be Internet based, capture field purchases of the warfighter, and be inexpensive (Burris 2006, 65).

The rapid development of commercial IT is also outpacing the Army's ability to know what is available to meet the warfighters' needs and then acquire it in a timely fashion. According to the former Director of National Intelligence, John Negroponte, "We are confronting adversaries who are achieving exponential improvements in their operations through widely available cutting-edge technology in which their R&D costs are any CEO's dream--zero" (deBorchgrave 2006, 1). As a result, the recent trends in Army acquisition are to field the latest technology to the warfighter as fast as possible without due diligence, type classification, and lessons learned. Without the proper research, development, and support, these rapidly and haphazardly fielded technologies and systems only serve to complicate the logistical and fiscal picture for future operations. Increasingly, the Army does not vet fielded items through type classification and integrate them into the logistical system, manage the fiscal challenges of warranty service and economies of scale, or incorporate the rapidly fielded and micropurchased IT systems into a requirements analysis and development cycle. Additionally, internationally interoperable and available commercial-off-the-shelf (COTS) technologies go unused in favor of multibillion dollar, multiyear ACAT-1D acquisition programs that continue to endure congressional reviews as they grow in program cost, repeatedly delay production, and become obsolete in development. More and more large-scale acquisition programs are becoming obsolete in development as they are overcome by emerging technologies. In terms of intellectual collaboration, disparate government and commercial information

sources of IT developments do not collaborate or worse, go unused by the people who need them most.

The Army has responded to the warfighters' requests with several rapid acquisition initiatives: Agile Development Center, the Rapid Fielding Initiative, and the Rapid Equipping Force. Additionally, a new major subordinate command within the US Army Materiel Command (AMC) was established, the US Army Research, Development and Engineering Command (RDECOM), to restructure core in-house capabilities to fully exploit the enormous potential that resides in research activities around the world. The intent of RDECOM is to respond rapidly by integrating, maturing, and demonstrating emerging technologies to field the right equipment, in the shortest time, for warfighters (rdecom.army.mil). The only issue with this rapid deployment of technologies is the management of fiscal, logistical, and functional knowledge. There are items being fielded and purchased by existing Army organizations that do not provide adequate logistic and functional (training) support. The challenge for RDECOM is proving their relevance and efficacy in a rapidly changing and chaotic fielding environment. Additionally, the KM of these programs and organizations for requirements analysis and fiscal stewardship remains to be addressed.

At every level of the Army's acquisition processes, from local purchase to acquisition category (ACAT) 1D, information about these procurements goes missing: what was bought, how much did each cost, how many were bought, what does it do, who did you buy them from, and where did you obtain it? No two units have a common operating picture of the status of available technologies, what works best, how much of what was bought, and what it cost them. These disparate acquisition practices create

second and third order problems for the Army as well, such as logistical challenges from failure to become type classified (no line item number (LIN) number), overpricing from the vendor due to a lack of economies of scale, limited to no warranty on the system. Technical support for the equipment is the users' responsibility, detracting from the mission, and small to moderate acquisitions go unrecorded or unanalyzed for fiscal responsibility and mission accomplishment or lessons learned. In light of all the expense and energy of transformation, a substantial amount of money, time, knowledge, experience, and energy is lost in the Army's current IT acquisition and management processes and procedures.

The DoD budget will be the highest it has been since World War (WW) II, exceeding $513 billion in fiscal year 2007, and higher than the rest of the world's military spending combined. China, the largest adversary, spends barely more than one-tenth of what the United States does, while North Korea and Iran each spend roughly one percent (Wheeler 2006, 1). Ironically, US military forces are smaller today than at anytime since 1945 in terms of Army divisions, naval combatants, and Air Force wings (Wheeler 2006, 1). This means that the DoD is spending more on less--technology is expensive and it is increasingly important that the services collaborate about capabilities, developments, and current acquisitions. A recent Reserve Officers' Association (ROA) National Security Report titled *Resourcing the Total Army* states that "increased spending results from our greater use of advanced technologies" and has significantly increased the cost per soldier from Vietnam to now: $1,137 to $17,472, respectively (Melcher 2007, 42). A world of unmanaged IT information is available to the military from various commercial and government sources that could improve its IT requirements analysis, efficiency of

acquisition, and stewardship of taxpayer dollars in this age of rapidly changing

technologies. This important issue is a challenge of KM to exploit synergies, to gain

efficiencies, and to gain economies of scale that ultimately save taxpayer dollars.

The primary concern of all this technology acquisition is fundamentally that of

necessity--the determination of what is needed by the force to achieve its mission. In

modern parlance, this is called "requirements analysis." This might seem like a straight-

forward process of commanders and leaders presenting their leadership with a request,

and that request being vetted and then filled; however, an inordinate amount of effort is

put into requirements analysis for the warfighter at very high levels of leadership (e.g.,

Joint Requirements Oversight Council (JROC), Joint Acquisition Requirements Board

(JARB)). The problem becomes very complex when the focus in today's military is

jointness and "doing more with less" (fewer people are available to manage requirements

analysis). Ultimately, the procurement of IT in today's military is best validated and

authorized when it meets the needs of many mission sets and services, yet costs the least

to acquire and maintain. A recent article articulates several parallels between the white

elephant that ADA was, and the stumbling behemoth, ACAT 1D Joint Tactical Radio

System (JTRS) program (Chapin 2004, all).

The $30 billion JTRS program is a current example of a major IT acquisition

struggling to win the technological race to stay relevant. The JTRS program serves as a

primary example of this thesis because it suffers from many of the problems that KM

would mitigate, such as requirements creep, escalating budget, slipping fielding schedule,

and overrun by today's commercial technology development pace. A 2004 Naval

Postgraduate thesis concluded that the commercial-off-the-shelf (COTS) IEEE 802.16

(WiMAX) standard would meet the requirements of a JTRS platform now and cheaper than JTRS, if JTRS is ever fielded (Guice and Munz 2004, 95). In a March 2006 briefing from the JTRS joint program executive office, Mr. Vic Popik stated in his briefing that of the high risk factors of the program's execution was the lack of an enterprise approach to acquisition and systems engineering practices. The Pentagon recently reorganized the JTRS program in December of 2005 into a $4 billion program, a 43 percent increase to the current budget. The Army is already seeking approval for an interim solution for software defined (programmable) radios (SDR); however, that might cost $18.5 million and 18 to 30 months to complete. JTRS is not a new trend, and it is not alone in its challenges. Recent budget busting, acquisition "white elephant" programs, such as the Crusader gun system, come to mind, but these technology acquisition challenges started as long ago as the 1970s with the development of new air defense artillery (ADA) system--Division Air Defense (DIVAD) named the Sergeant (SGT) York.

Another one of the Army's technological acquisition challenges dates back to its need to replace the aging M163 20 millimeter Vulcan ADA gun and M48 Chaparral missile systems. Over the course of three decades and four successive generations of cancelled ADA systems (Mauler to Roland to SGT York, ADATS), the Army spent $6.7 billion (Available Online at www.globalsecurity.org. Accessed on 25 November 2006). A Naval Postgraduate School thesis studying the SGT York reveals striking similarities in program development and acquisition between the SGT York and JTRS. The Army embarked on a technological solution path to satisfy its current ADA requirement in April 1977. The rapid (accelerated) acquisition strategy of that time was called a non-developmental item (NDI). When former Secretary of Defense Casper Weinberger

cancelled the program in August 1985, the SGT York cost the taxpayer and the Army

eight years of development and production, $1.8 billion (in 1985, $300-500 million was

salvaged for use on other systems) spent, and 65 SGT Yorks produced. The "Lessons-

Learned" section of Mr. Hinds' thesis reveals some fundamental problems that ultimately

led to the program's demise, among them: enormous integration of hardware and

software that required numerous modifications (time and money), unproven components

required more developmental testing and operational testing, failure of the program office

to conduct a market investigation that would have uncovered developmental problems,

and failure to utilize the latest technology available (Hinds 1995, 35-37). A May 2005

article from *The Space Review* noted the worst hour of the SGT York's development

during a demonstration for Congress, "Who could ever forget the SGT York system

mistaking a fan on the roof of a latrine for an attacking aircraft during its big demo for

Congress?" The same article also notes that industry studies report that over 70 percent of

IT projects fail (Hedmun 2005, 2). One would think that decades of unsuccessful military

system development would constitute a real need for the Army and DoD to minimize risk

of IT development and acquisition by closely collaborating with the commercial market

as well as systematically monitoring internal system development and acquisition.

The previous examples are large-scale, ACAT 1D, programs that suffer from

similar technological challenges and sometimes failure, but there are still acquisition

challenges with programs that survive development. In the interest of time, money, and

obsolescence, the Army has increasingly opted to skip the process of type classification

(TC). TC provides a guide to authorization, procurement, logistical support, and asset

readiness reporting. TC is the Army's implementation of the DoD financial management

regulation requirement for a determination that an item is "accepted for service use" prior to spending procurement funds (AR 70-1 2003, 8-2). TC is basically the Army's "soldier-proofing" test that is required for any item to get a line item number (LIN) so that it is tracked and managed in both the acquisition world and the supply world. This solves some problems (time to field and obsolescence) in the short term, but ultimately creates a wasteland of replacement procedures and supply challenges. Without a LIN number, the current supply programs, Standard Army Maintenance System--Enhanced (SAMS-E), SSN-LIN Automated Management and Integrating System (SLAMIS), and the Property Book Unit Supply Enhanced (PBUSE) are loathed to follow the technology program transitions or track shortages and overages.

Additionally, there are ways around the Army's acquisition programs altogether, such as personal or unit discretionary funds. Commanders at every level are given a discretionary fund for equipment and training not provided by the Army, in order to obtain items they think they need to accomplish the mission. This type of local or small-scale acquisition might seem inconsequential at the microeconomic level, but the aggregate of this practice creates several significant challenges and waste in the Army and DoD: warranty and repair issues, taxpayer stewardship, requirements analysis, joint interoperability, frequency management (wireless systems), and security (wireless systems). The fundamental problem in the Army's acquisition procedures and policies is the lack of a way to capture a complete picture at the microlevel and macrolevel, as well as the KM of rapidly developing technologies.

Many synergies exist within the government and commercial market for developing a streamlined Army and DoD acquisition program that would save the

taxpayer money; save the tactical, operational, and strategic operators time and energy; and project multiple views of the situation for microanalysis and macroanalysis. In my recent tenure as a consultant with Booz Allen, I was supporting the Office of the Secretary of Defense for Networks and Information Integration (OSD/NII) for the JTRS program. OSD/NII asked a colleague and I to evaluate the antenna technology that could be utilized by the then "cluster one" (one of the two Army JTRS versions, now "Ground Mobile Radio"). Our analysis of smart antenna technologies revealed the sobering reality of ubiquitous antenna design, but more importantly the fact that all of the services have a habit of ignoring their own research labs, as well as sister service labs, for large, overarching programs of record. It turned out that the Navy had been doing just the very research that the Army would have benefited from immensely and the Air Force had struggled with similar antenna challenges. The major take away from our study was that the US government (USG) spends a lot of taxpayer dollars on DoD labs without an ounce of application to one of the Army's (and DoD's) largest procurements and technological endeavors of all time. There is a pervasive shortage of KM in the DoD. According to Lieutenant General (LTG) John M. Riggs, Director of Future Force Task Force, one of the primary capabilities envisioned for the future force is "a 'smart KM system' that knows the user, what the user does, and what he or she needs and that pushes knowledge to the user as well as pulling it from the network when needed" (2003, 2).

There are some recent developments in KM in the Army that show promise, but the Army still not implementing some simple and available synergies (leveraging other government programs and burgeoning commercial developments). Examples of these synergies as a solution to the primary question of this thesis are: objective commercial

test labs--government computer news (GCN) test laboratories; government labs--the

National Security Agency's wireless technologies vulnerability database and the secure

mobile environment integrated products team (SMEIPT); service labs--Army Research

Lab, Air Force Research Lab, Naval Research Lab, and Defense Information Systems

Agency's (DISA) net-centric capabilities lab; linking existing government databases and

programs of accounting and fiscal planning (e.g., Standard Army Retail Supply System

(SARSS), the Business Transformation Agency's (BTA) eSF44 initiative, and the

Army's COMSEC management database -Army's Network Enterprise Technology

Command's (NETCOM) ISSP database) with the Army's existing KM centers (e.g.,

BCKS and Center for Army Lessons Learned (CALL)) and other collaborative websites,

such as craigslist.com and baseops.net.

Research Question

The purpose of this study is to answer the primary question of whether or not the

Army is effectively and adequately utilizing innovative KM tools for its IT development

and acquisition practices. For the purposes of this thesis, an analysis of whether or not the

Army is employing innovative (IP based) tools to manage the knowledge of IT

acquisitions will be made.

This study is an investigation into the tacit and explicit knowledge of IT that the

Army offers. Several (secondary) questions will be addressed in the research, such as:

Given the ever increasing pace of IT evolution, has the Army developed KM tools that

will inculcate lessons learned down to the tactical level and capture the vital fiscal and

logistical information that can provide an operating picture for future force development?

Are the Army's old acquisition practices and requirements review board procedures

aggregated and analyzed by anyone? Additionally, is the Army offering information to the warfighter for COTS IT at the operational and tactical level? Even though the Army offers some KM websites that attempt to circulate the experiences and lessons learned for officers and soldiers, is there a proactive, corporate knowledge push to these websites where they can find information on IT systems or best practices from other units and individuals? Given the new focus of RDECOM, is the organization implementing any innovative (IP-based) KM tools to capture lessons learned, collaborate with commercial development, and capture acquisition details?

<p style="text-align:center">Assumptions</p>

In order for this analysis to have the maximum fiscal and operational impact on the Army, the general assumption must be made that the acquisition of IT will continue to permeate every level of the organization without institutional knowledge of it. Soldiers will continue to buy police scanners and commercial GPSs, units will continue to (micro) purchase commercial satellite access and ancillary hardware without reporting it, and the Army itself will continue to field equipment that does not have a LIN number, preventing a soldier or leader from easily finding the replacement system when contract and technical support of the device expires.

It is also assumed that there is a significant savings to be gained by incorporating a KM solution to the acquisition of IT. The scope and delimitations of the analysis are stateed later in this chapter. A reasonable assumption is that there are savings to be made in terms of taxpayer dollars, lessons learned, and requirements development.

<u>Limitations</u>

The limitations of this research are that the time or resources required to conduct a survey of all the current and deployed forces to know what types of IT acquisitions might have been made are not available. In spite of that fact that, a plethora of examples concerning the lack of collaboration on IT capabilities, acquisitions, and support exist.

<u>Scope and Delimitations</u>

The scope of this research will encompass tacit and explicit knowledge as it pertains to Army acquisition and fielding programs, from micropurchases to ACAT 1D. The focus of KM will include all forms of information exchange: individuals to individuals, individuals to unit or agency, and unit or agency to individual. The level of acquisition is of no consequence to the analysis, but serves to make the point that the challenge of KM exists at every level of IT acquisition. Joint programs are only cited as examples if they have an Army IT application or element. The KM analysis will cover types of knowledge (e.g., fiscal, logistical, training and sustainment) and how they relate to one another. This analysis will review the IT knowledge aspects of the acquisition or fielding, functionality implementation (training), and lessons learned of a particular IT capability, however it was acquired for the fight.

The first phase of the research will establish the contemporary aspects of epistemology (the study of knowledge) and the status quo of the Army's IT KM. Many of the secondary and tertiary questions will be asked to establish the baseline of where the Army came from and where it is today. Hopefully, a plethora of information about KM innovations and resources that the Army could use to ultimately save the US taxpayer time, money, and energy will be discovered. This initial analysis will include research

into what some burgeoning KM programs are doing for the Army, such as the BTA and the Army's RDECOM, respectively. Through the course of answering the primary question, a determination will be made of what characteristics of the system will make it successful, such as: accessibility (bandwidth), structure/format (graphic user interface), copyright and classification management, and server support and maintenance.

With this initial analysis of KM and the current status of it in the DoD and Army for IT acquisition, the challenges and shortcomings will be analyzed. This phase will be the focus of the research as a case study of these four KM web services will be conducted on two Army sanctioned, one pseudo-government, and one pseudo-private: BCKS, craigslist.com, baseops.net, and CALL. I have worked with many such databases recently (e.g., ISSP, PBUSE, SAMS-E, or SLAMIS) and have investigated other government and commercial resources, such as technology test labs at the services' labs, NSA, and other major commercial industry leaders, that could lend themselves to possible innovations in IT requirements analysis, acquisition and tax stewardship.

The final efforts will incorporate the comparison of current KM systems, the completion of the thesis findings, recommendations, and then seeking approval from my committee to present the completed thesis. With the second and tertiary questions answered, several key interviews with the current Army leadership, and some research into KM, the primary question will be sufficiently answered with recommendations.

What will not be included in this analysis, are the personal experiences of each and every soldier in the COE. In the interest of time and academic requirements, I am not able to conduct a survey to a unit or organization. Additionally, this study will not cover every joint program or system either fielded or in development that might impact the

Army, but just a select few will be cited as examples for their Army relevance. In terms of metrics, this analysis will not attempt to evaluate how much money or time could or has been saved by a collaboration of acquisition information and cost analysis. That effort would take years and many audits to conduct.

Significance of Study

This study should have direct correlation to the transformation of the DoD, as stated in the *Quadrennial Defense Review Report (QDR Report)*, to improve its practices and procedures for sharing knowledge and learning. A significant amount of knowledge regarding IT acquisition goes missing every day, and the sooner it is institutionally captured and exploited, the better off our warfighters and our nation will be.

Summary and Conclusions

In conclusion, if the Army does not get better control of the IT acquisition and of KM of it, then they will eventually subvert their requirements analysis, fiscal planning, and logistical management. The following research investigates the history and schools of thought on KM (epistemology) and how that relates to the transformation of IT acquisition and management practices and procedures called for in the *QDR Report*.

CHAPTER 2

LITERATURE REVIEW

It [KM] is not rocket science. . . . [I]t's good sense and managerial basics. (1998, 177)

Davenport and Prusak, *Working Knowledge: How Organizations Manage What They Know*

Introduction

This study is an investigation into the tacit and explicit knowledge of IT that the Army offers. In the thesis research, several secondary questions are addressed: Given the ever increasing pace of IT evolution, has the Army developed KM tools that will inculcate lessons learned down to the tactical level and capture the vital fiscal and logistical information that can cheaply and effectively provide an operating picture for future force development? The Army has old acquisition practices and requirements review board procedures, but does anyone aggregate and analyze them? Additionally, is the Army providing information to the warfighter about COTS IT at the operational and tactical level? The Army offers some KM websites that attempt to circulate the experiences and lessons learned for officers and soldiers, but is there a proactive, corporate knowledge push to these websites where they can find information on IT systems or best practices from other units and individuals? Given the new focus of the RDECOM (see chapter 1, page 5), are they implementing any innovative (IP) KM tools to capture lessons learned, collaborate with commercial development, and capture any acquisition details?

The value of KM relates directly to the effectiveness with which the managed knowledge enables the members of the organization to deal with today's situations and

effectively envision and create their future. Without on-demand access to managed knowledge, every situation is addressed based on what the individual or group brings to the situation with them. With on-demand access to managed knowledge, every situation is addressed with the sum total of everything anyone in the organization has ever learned about a situation of a similar nature (Bellinger, Castro, and Mills 2004, 1).

Extensive research on the concepts of KM has been done with many more articles than books found, and several key authors dominate the books. One article in particular, "The Quality of Evidence in Knowledge Management Literature: The Guru Version," by Ekbia and Hara evaluates the evidence that is presented in KM literature by popular books. This article is very useful for two reasons: it provides the results of their literary analysis from 1988 to 2003, and it also suggests an interesting technique in researching the most prominent authors of the subject. First, they researched numerous articles about KM, and picked out a few books from each bibliography and reference section and evaluated the authors' career and education. Second, they went to Amazon's website, and searched on the best selling books on KM in December 2002 and April 2003. They then picked five books from the top twenty of each time and studied their analysis of KM. This technique has been helpful in verifying that the research is converging on the same list of authors as the general public's appetite for KM literature. In further research, it was challenging to find literature from a defense service perspective. There are a few books that touch on the subject very passionately, but none that really serve to provide applicable insights. Some articles that were found, including a Masters of Military Arts and Science thesis, suggest seriously incorporating KM into the business of defense--the

thesis goes so far as to say it should be the corps competency of the Army's Military Intelligence branch.

In order to properly understand the concepts of KM, one must understand the true meaning (as best collectively defined) of knowledge. Chapter 2 develops the concepts of KM and its relation to this thesis from some basic definitions, types, aspects, history, and concepts of KM. The last two sections of this chapter tie the application of KM to IT acquisition in the Army.

<div align="center">Current Writings</div>

In order to better define KM, the terms of KM parlance based on current writings are defined to give context to the most evolved and currently accepted meaning and concepts of KM. An example of this is the common confession that "knowledge" and "information" are often used interchangeably; however, the KM community makes very distinct delineations between them.

<div align="center">Knowledge Background and Basics</div>

In order to know how best to manage knowledge, one must have a reasonable understanding of knowledge. There are many different concepts of knowledge relationships and terms to describe knowledge. KM literature often points out that, to the peril of many a business, the relation between knowledge, information, and data is often misunderstood, such as: "Knowledge is neither data nor information, though it is related to both, and the differences between these terms are often a matter of degree. . . . Confusion about what data, information, and knowledge are--how they differ, what those words *mean*--has resulted in enormous expenditures on technology initiatives that rarely

deliver what the firms spending the money needed or thought they were getting"

(Davenport and Prusak 1998, 1).

Epistemology is the "study or a theory of the nature and grounds of knowledge especially with reference to its limits and validity" (m-w.com 2007). It is the branch of "philosophy" that studies the nature and scope of "knowledge" and "belief." The term "epistemology" is based on the Greek "episteme" (knowledge) and "logos" (account/explanation). It is thought to have been coined by the Scottish philosopher James Frederick Ferrier. Plato's concept of knowledge in terms of epistemology is what is both true and believed, but not all that is both true and believed counts as knowledge. His concept of knowledge is most succinctly conveyed in this Venn diagram (figure 1).
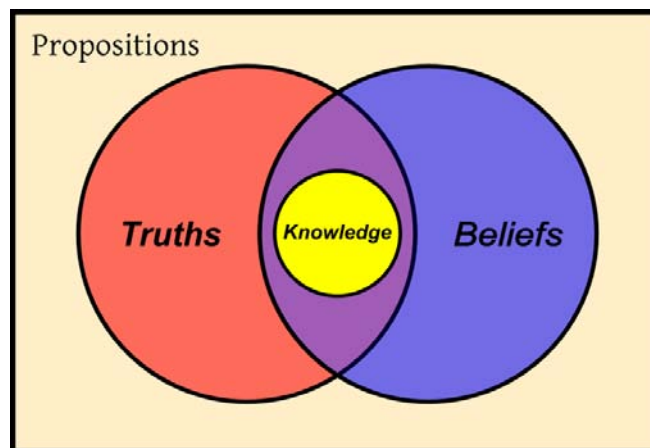
Figure 1.   Venn Diagram of Plato's Concept of Knowledge
Source: En.wikipedia.org, According to Plato, knowledge is a subset of that which is both true and believed (http://en.wikipedia.org/wiki/Epistemology, accessed 3 May 2007)

Definitions

Most epistemologists agree on the distinctions that define knowledge based on the

Data/Information/Knowledge (/Understanding)/Wisdom (DIKW) model that was first

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suggested by T. S. Eliot, in his poem "The Rock" (Sharma 2005, 2). It was later put in the context of KM in the late 1980s, with the addition of "understanding" between knowledge and wisdom, by Milan Zeleny and Russel Ackoff (Ackoff 1989, 16:3-9; Zeleny 1987, No. 1, 59-70). Critical to his model is the idea that attaining wisdom is the only way people can create the future rather than just grasp the present and past. Several years after this cognitive hierarchy was proposed, there was a major surge in the number of KM articles published and KM took off in the corporate world of business development (Ekbia and Hara 2006, 2). It is also well defined in the army Field Manual 6-0, *Mission Command: Command and Control of Army Forces* (August 2003). The utility of understanding the hierarchy of knowledge is realizing the critical steps in the cognitive process of coming to a wise decision.

Data is the most fundamental element of knowledge and yet the most important. It is factual information used as a basis for reasoning, discussion, or calculation. Data is gathered by observation or measurement and can be structured or raw material, useful, irrelevant, or even redundant information (Ahsan and Shah 2006, 3). Early in the computer age, the business world would process data to produce reports that management analyzed to make informed decisions. Later, data was combined with other business indicators to produce information about production and profitability. Left unto itself, data is usually considered ineffective, but synthesized, it becomes information. Thus, data is the basic unit of information.

Information is commonly understood to be the result of analysis, investigation, or study of a set of data in a particular context. If data sources are flawed, then in most cases, the decisions based on it will be too. The result of this analysis or study of data

creates relational connections, or meaning. In this way, information can be considered synonymous with intelligence or news in most cases because they all have meaning. Information comes in a variety of forms, such as: writing, statistics, diagrams, and charts (Godbout 1999). An example of the difference between data and information is gang symbol graffiti. This random scribbling is raw data to the average person, but put into the context of gangs and their graffiti, it gives meaning to the lines of paint and thus, information to someone like the gang members or the police. In computer parlance, a relational database uses data to make information, such as the example in the preceding paragraph. As one might guess, the logical progression follows that information is the basic unit of knowledge. When a range of information is interpreted for meaning, it becomes knowledge.

Knowledge is a collection or range of appropriate information so that it becomes useful. It is a local practice or relationship that tells one how something works. Once the human mind has developed a mental structure of these relationships, it can choose between alternatives, and is therefore intelligent. Modeling and simulation applications in today's computer age are exhibiting intelligence in this regard. Computer models such as National Oceanic and Atmospheric Administration's (NOAA) hurricane path prediction systems rely on stored knowledge to make a prediction. Knowledge is a deterministic process, but it does not provide for the ability to amass future knowledge in and of itself. An example of this is the memorization of information. Someone who has memorized that 8 x 7 = 56 could not determine what 56 x 7 is without an understanding of multiplication. It is said that the difference between knowledge and understanding, is the difference between memorizing a relationship (e.g., the "times tables") and learning a

process (Ahsan and Shah 2006, 3). There are many different types of knowledge (e.g., tacit, explicit) and several aspects of knowledge (e.g., KM, knowledge logistics, knowledge integration, knowledge ecology) that will be discussed later in this chapter.

Understanding is a cognitive and analytical ability to take knowledge and synthesize new knowledge from it. "People who have understanding can undertake useful actions because they can synthesize new knowledge, or in some cases, at least new information, from what is previously known [and understood]" (Ahsan and Shah 2006, 3). In this regard, NOAA's hurricane computer models mentioned above provide new knowledge by synthesizing new information or knowledge with previously held knowledge to help us understand the future of a current hurricane's course. Unfortunately for all of us, this model is not smart enough yet to account for all the forces of mother nature that are at work and is, therefore, not always very accurate, but it is getting better every year. Perhaps this serves as a practical example of the difference between understanding and wisdom--with wisdom, people can not only grasp the present and past, but predict the future (Ahsan and Shah 2006, 3).

The concept of wisdom is best thought of in terms of behavior, based on one's understanding. While understanding is an interpolative and probabilistic process, wisdom is nondeterministic and nonprobabilistic. "[Wisdom] calls upon the previous four levels of consciousness, and specifically on special types of human programming (e.g., moral and ethical codes)" (Ahsan and Shah 2006, 4) to develop a philosophy about a subject (e.g., torture, national security, weather). It is the process by which we judge well from bad, or right from wrong. According to Ahsan and Shah, wisdom resides as much in the heart as in the mind and therefore, requires a soul, making it uniquely a human state. I

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agree with them too that a soul is something that a machine will never be able to model (Ahsan and Shah 2006, 4).

The preceding paragraphs lay out the most commonly used and agreeable cognitive hierarchy (the DIKW model), but this is constantly challenged. Through careful investigation, people have produced varying and differing definitions for these same terms. George Pór suggests that knowledge is not a "thing" that can be "managed." It is a capacity of people and communities, continuously generated and renewed in their conversation, to meet new challenges and opportunities (Pór 1997). In keeping with the DIKW model, the following graph (figure 2) reflects both the progression of cognitive transformation from raw, unfiltered facts and symbols into information, knowledge, and eventually into wisdom and the academic development of knowledge philosophies through the last five decades.

The DIKW model, however, can be turned upside down. That is, knowledge can be "reverse processed" to become data. Bills Gates is quoted to say that "photographs, films, and videos are all being converted into digital information. Every year, better methods are being devised to quantify information and distill it into quadrillions of atomistic packets of data" (Gates, Myhrvold, and Rinearson 1995, 23). George Pór proposes the concept of knowledge ecology, which will be discussed later in this chapter, along with other concepts and components of KM.
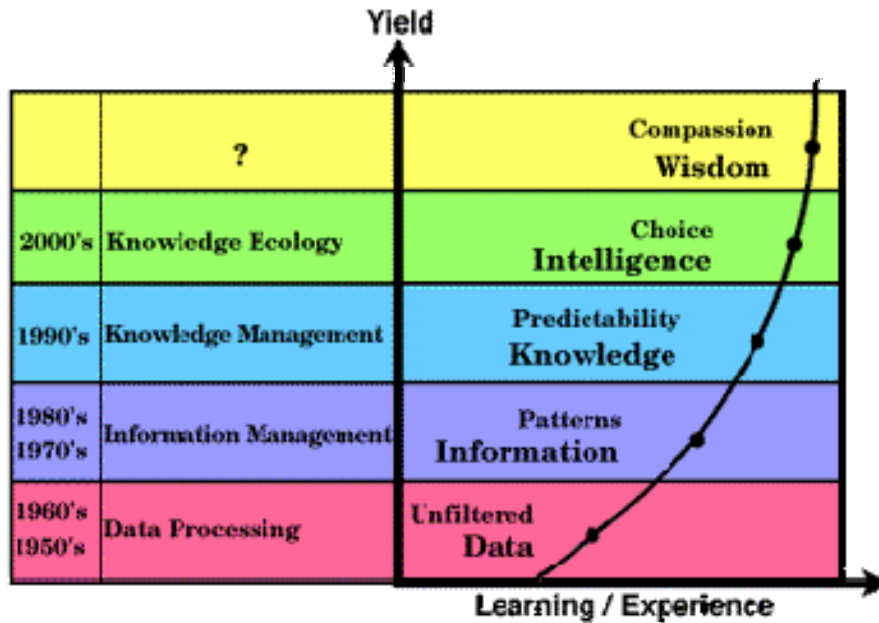
Figure 2.   Cognitive Progression through the Decades
Source: Pór, *The Data to Wisdom Curve* (http://www.co-i-l.com/coil/knowledge-garden/kd/dw.shtml, 1997) © Copyright, 2001

Types of Knowledge

Knowing the commonly accepted cognitive hierarchy is the first step to realizing how knowledge is acquired, stored, and transferred. The next step is realizing types and aspects of knowledge. In this subsection, commonly accepted definitions are provided for the types of knowledge and follow up in the next with the aspects of knowledge. Although they have been recently subdivided, there are two basic types of knowledge: tacit and explicit.

Tacit knowledge is informal knowledge involving personal belief, perspective, and values (Polanyi 2006, 2). It is considered the first type of knowledge a person has, which might be unknown to the person. Dr. Michael Polanyi was a Hungarian-British scientist and philosopher who wrote about a process, not a form, of knowledge called tacit knowledge. Like a lot of things, "tacit knowledge" was later interpreted to mean a

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type of knowledge that is only known to you and hard to share with others, such as one's culture. It has come to be known as knowledge that one has learned through experimentation, but usually cannot be easily conveyed without extensive personal contact or training, such as learning how to ride a bike or swim. Tacit knowledge can be an advantage and a disadvantage because it is inherent to a person or organization. In most cases, one is not aware of the knowledge he or she possesses, which could be a strategic advantage, but one also is not able to easily share that knowledge to help others grow.

Explicit knowledge is referred to as formal knowledge and is the most common and frequently shared knowledge in society--the opposite of tacit knowledge. It is the consciously understood and easily articulated knowledge that the Army and DoD deal with daily, such as policies, operating procedures, field manuals and operations orders. This type of knowledge is very conducive to technological solutions and applications (e.g., databases, servers).

Aspects of Knowledge

Types of knowledge are thought of in terms of epistemology, but the aspects of knowledge (and many other things) can be considered in ontological terms--where it exists. Nonaka and Takeuchi saw knowledge as existing in four possible entities or social levels: individual, group, organization, interorganization (Nonaka and Takeuchi 1995, 57).

The different components of KM are introduced in later sections, but the idea of knowledge transfer between types and aspects of knowledge is important to conceptualize here as a relationship between the two types and four aspects of knowledge. Nonaka and Takeuchi developed a model that represents a two-dimensional theory of knowledge creation that depicts four modes of knowledge transfer or conversion: socialization, externalization, combination, and internalization (SECI) (see table 1).

Table 1.   Nonaka and Takeuchi Model of Knowledge Transfer Modes

Knowledge transfer process	From	To	Method of transfer
Socialization	Tacit	Tacit	Empathized
Externalization	Tacit	Explicit	Articulated
Combination	Explicit	Explicit	Connected
Internalization	Explicit	Tacit	Embodied

Graphically, the model takes the two dimensions of knowledge (epistemological and ontological) and analyzes the transfer or conversion of knowledge between them (Nonaka and Takeuchi 1995, 62). Figure 3 illustrates the SECI model which depicts how knowledge is transferred or converted from one type to another (Nissen and Levitt 2005, 7).
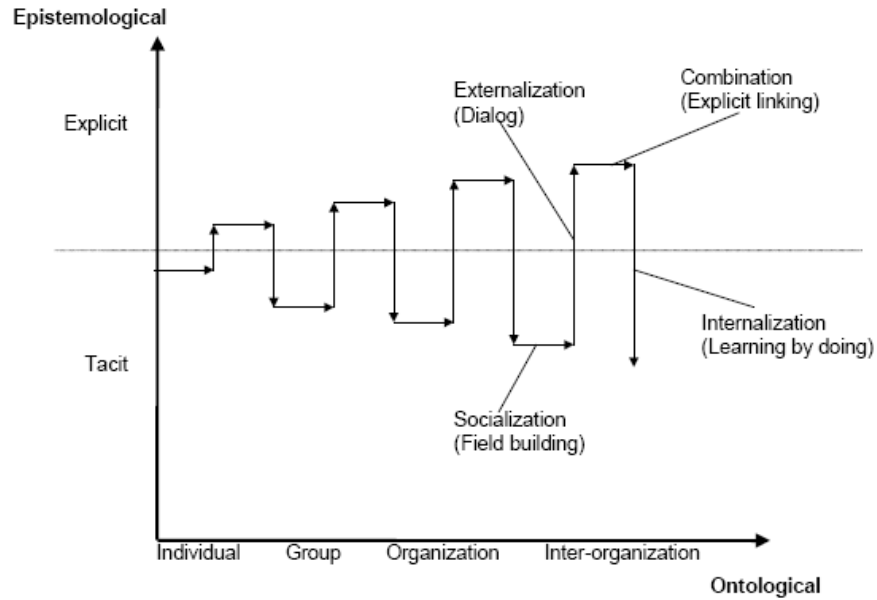
Figure 3.　Two-Dimensional SECI Knowledge Transfer Model
Source: Levitt Nissen, *Spiral Model (adapted from Nonaka 1994, Nonaka et al. 1996);*
available from http://www.stanford.edu/group/CIFE/online.publications/WP076.pdf;
Internet; 2002), 7. Copyright 2002 by Center for Integrated Facility Engineering

Recent developments have transcended this straightforward concept. Nonaka and

Takeuchi have further expanded their concepts of knowledge creation processes, which

have three elements: SECI, "Ba," and Knowledge Assets. "Ba," having no direct

translation, defines the platform (e.g., face to face, or virtual) of interaction that is

creating or transferring knowledge. Accordingly, there are knowledge conversion modes

that correspond to the SECI model. Additionally, knowledge assets are those specific

company or organization assets or best practices that they use to create and transfer

knowledge. Nonaka and Takeuchi also developed a four mode model for this element:

experiential, routine, conceptual, and systematic (De Geytere 1995). Recently, critics

have refuted the SECI model claiming that the empirical evidence used to substantiate the

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model is weak or nonexistent. They also claim that flaws in the SECI model will also affect the wider theory (Gourlay 2005, 3).

Other sources talk about the transfer of knowledge between the individual and the organization, and vice versa, in terms of strategies: codification strategy is how to codify an individual's tacit (experiential) knowledge into explicit (documented) knowledge; and, a personalization strategy focuses on transfer of tacit knowledge between individuals through communication and observation (coaching) (Wissensmanagement Forum 2004, 10).

Knowledge Management

The previous paragraphs have explained the fundamental definitions of knowledge, types of knowledge, and the processes of transferring between types. Many different aspects about the knowledge level of cognitive hierarchy have evolved through careful study, experimentation and application. This section contains an explanation of how KM applies to the acquisition of IT at all levels in the Army. It outlines a succinct definition of KM; unfortunately, the one consensus about KM is that its definition is not universally accepted. The definition ranges from software tools to organizational change, but the focus is always on knowledge for reuse, awareness, and learning across the organization. There are compiled lists of definitions for KM by different authors in various articles, websites, and books. The Gartner Group definition of KM is the most widely regarded and provides the best definition that the Army and DoD can relate to: "KM is a discipline that promotes a collaborative and integrated approach to the creation, capture, organization, access and use of an enterprise's information assets. This includes databases, data warehouses, search engines, data modeling and visualization tools,

documents and, most importantly, the [uncaptured, tacit] expertise and experience of individual workers" (Cushman 1999, 4).

History

Keeping with the DIKW model and Pór's diagram, knowledge is the cognitive progression from information, and articulated here is how modern KM has its beginnings in the information age. KM's contemporary roots date back to mid-twentieth century, when the first wave of post-World War II college students reached the work force with an edge on life, called higher education, thanks to the Bonus Army's achievement of the G.I. Bill of Rights after World War I (Koulopoulos 1999, 10). According to some sources though, the concept of KM is hundreds, if not thousands, of years old.

Before the 19-year-old French scientist Blaise Pascal invented a mechanical calculator in 1642, the Asians had been using the abacus for nearly 5,000 years. Looking at the major periods in human development from the Ice Age, to the Stone, Bronze, Iron, Medieval, Industrial, and finally the Information Age, a perspective is gained of what knowledge really means in terms of human evolution. By most accounts, today's Information Age began with Samuel Morse's invention of the telegraph transmitter and receiver in 1837. It was the first instrument to transform information into electrical form and transmit it reliably over long distances, thereby transferring knowledge quickly over great distances. As Bill Gates states, "What characterizes this period in history, what sets it apart, is that ability to refashion information--the completely new ways in which information can be manipulated and changed--and the increasing speeds at which we can handle information" (Gates, Myhrvold, and Rinearson 1995, 23).

The "father" of first generation KM, Frederick Taylor, reportedly first applied KM to scientific management (McElroy 2002, 9). Several sources attribute the coining of the term "knowledge management" to Karl Wiig, at the 1986 United Nations International Labor Organization (UN-ILO) conference in Switzerland (Wiig 1997). Ackoff's 1989 article on the knowledge hierarchy model, the Data/Information /Knowledge(/Understanding)/Wisdom (DIKW) model, was one of the major milestones in KM conceptualization. According to the quality evidence of KM literature (Ekbia and Hara 2006, 2), the number of articles rose from 13 in that year to a peak of 9,907 in 2001. In about ten years, KM went from the abstract, ambiguous concept to being the new strategic resource for increasing productivity, with economic value, and the stability factor in an unstable and dynamic competitive environment. By 2000, KM had become a major tool attributed with bringing a competitive advantage to corporations.

Schools of Thought

In terms of the evolution of cognitive hierarchy, KM is a relatively recent development. Corporations learned many hard lessons and tried meeting the challenge solely with technology and money, not processes and culture. Business philosopher and executive consultant George Pór states that organizations obsessed with extracting and measuring knowledge will not have much to measure, unless they shift the focus of their knowledge initiatives to developing an open culture of communication and collaboration that is supportive to the sharing of innovative work and business practices (Pór 1997). Modern KM permutations have evolved to even suggest that the Army's Military Intelligence branch should take on KM as its central role (Jewell 2003) and that military organizations need KM officers (Hearne 2005). To achieve a better understanding of

what exactly KM means and the semantics of these current KM concepts, the thesis will start from the beginning of KM and work up to the current innovative applications of KM as they relate to this thesis.

Types of KM

There are a few fundamental types and aspects of KM that are essential to understanding the application of KM solutions. Most sources agree on the definitions of the following concepts and terms, but may differ in the history of its founding or conceptualization. There has been a lot of work done in the Japanese community on these definitions and concepts, but the origin source is most often Western culture.

Several sources delineate the importance and application of KM down into tactical, operational, and strategic levels. This was a good approach to KM for this thesis because of its obvious parallel to the Army and DoD way of conceptualizing levels of operations. To start small and build--the tactical level of KM is what is expected to associate with the "working level" of company grade operations. That is, this level refers to the tacit and explicit knowledge to share, the information technology in place to adequately share it, and the willingness and buy-in of the individual or collective to participate. The operational level of KM is a transitional level of using the technological solutions and organizational policies and procedures to achieve the objectives of the strategic level--in a phrase, "getting the right knowledge to the right people at the right time so they can make the best decision" (Petrash 1996, 1). Building on Petrash's definition, LTG Vines recently characterized operational KM as, "synchronizing people, processes, and technology to deliver the right information, to the right people, at the right time in order to achieve battlespace dominance" (2006, 42). It can also be thought of in

terms of using the existing explicit corporate knowledge to create new knowledge and even tacit knowledge. At the strategic level, Ermine states that KM provides that strategic vision of what the global objectives are that helps develop managers and provide stability in a dynamic and competitive environment (Ermine 2000, 1-7). The Wissensmanagement Forum also states that the strategic plan for KM should not only ensure that the organization is doing the right things, but continually improve the KM processes and institutionalize them (Wissensmanagement Forum 2004, 17).

Components of KM

There are some arguments that the important issue of KM is not the distinctions between different types of knowledge, but how knowledge is applied and acquired in order to achieve a positive result that meets business requirements (Barclay and Murray 1997, 3). Others claim that the type of knowledge is most important because it will dictate the type of solution that an organization must employ. There are many theories and concepts surrounding the components of KM, like "knowledge psychology," "knowledge ecology," and "operative knowledge." These concepts are not the focus of this thesis, but are shared here only to make the point that there are many pieces to the practical application of KM. The purpose for researching KM is not to pull apart every conceivable aspect of it, but to articulate the relevant components that define its application to IT acquisition.

There are many components of KM that get used interchangeably or in lieu of KM (e.g., knowledge processing or knowledge integration). Some sources argue that there are seven components to KM, namely: creation, acquisition, storage, sharing, transfer, application, and renewal of knowledge (see figure 4). "C.A.S.S.T.A.R is a

dynamic process, and when supported by technology infrastructure and the right KM

tools, it can create a very powerful KM system" (The Media Shoppe and Dr. Wilson Tay

2003). Other sources have divided KM into four main components: creation, sharing,

dissemination, and store (Tey 2007); or similarly, identification/discovery,

creation/acquisition, capture/storage/codification/retrieval, and sharing/transfer/flow

(Henczel 2004, 2). In many cases, the component or aspect of KM that gets the most

attention is the transfer piece--discussed in earlier sections. Knowledge transfer is the

most critical component of KM because without it, there is essentially no KM.
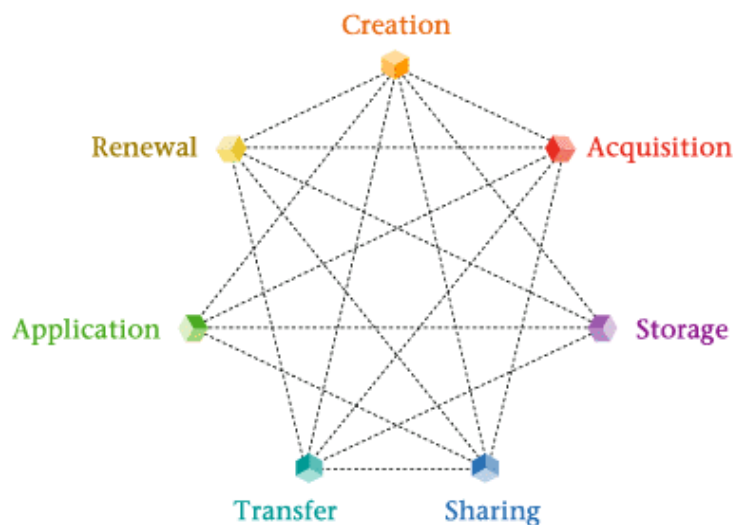
Figure 4.   CASSTAR: The Processes of KM
Source: Transknowformance.com, *C.A.S.S.T.A.R - The Processes of Knowledge Management* (http://www.transknowformance.com/article.cfm?id=14&page=2, accessed on 3 May 2007) © 2002-2003 The Media Shoppe & Dr Wilson Tay. All rights reserved.

Knowledge Integration (KI) and KM

A unique aspect of KM involving knowledge transfer is what some refer to as KI.

According to Jetter, KI is a KM process of external knowledge identification and

acquisition, and internal use of external knowledge (Jetter 2006, 1). Another source looks at KM in terms of a living social cycle consisting of supply-side and demand-side knowledge, namely, KI and knowledge production, respectively (McElroy 2002, 8). This view of KM (or knowledge processing, whatever it is called) is just another attempt at patenting the aforementioned KM processes for the sake of name recognition.

The KM consultants interviewed at Booz Allen Hamilton for this thesis see KI as a bigger, broader process than just KM. They think of KI in terms of a wire rope, with strands consisting of communication, people, technology, processes, and leadership. This concept very much mirrors the latest KM theories of practice, which focuses more on the organization--a key approach to KM was noted in the opening paragraph of this chapter.

The point is that knowledge is ubiquitous, internal, external, old, and new. There are distinct processes that must take place, but certain aspects are as informal as water cooler chats. Whether the knowledge is generated from within or acquired from outside, the formalization of managing the process is what matters and it is all really just KM. There are numerous papers written about the confusion of what all the processes and components of KM are, but for the purposes of this thesis, it is critical to note that this is the construct that applies to the acquisition of IT within the Army. This point will be made clearer in the following section.

<div align="center">KM for the Army</div>

There are very few books written about the business of KM as it applies to the Army, but significant activities and efforts at all levels of the service ranks are increasingly integrating KM into the business of the DoD. The US Army's one formal guidance document on KM is AR 25-1, *Army Knowledge Management and Information*

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Technology, and a review is included later in this section. Some might argue that it always has been the business of the Army, but that it just has not been formalized as such. Very senior levels of leadership in the Army are convinced that KM is a capability that needs to be seriously addressed, but they do not go to the extent of trying to define the exact components or processes involved. While KM ideas have been around for years, the implementation of KM was significantly accelerated when former Defense Secretary Donald Rumsfeld issued a directive for transformational thinking and action throughout the military.

Then Secretary of the Army John White and then Chief of Staff of the Army, General Eric Shinseki, signed the first guidance memo communicating the existence of Army KM (AKM) was issued August 8, 2001. It as a central part of the Army's transformation into a network-centric, knowledge-based force (Army.mil 2007a). "AKM is intended to improve decision dominance by our war fighters and business stewards—in the battle space, in our organizations, and in our mission practices" (Barquin 2004). To date, there have been four AKM guidance memos issued altogether. More recently, senior leadership in TRADOC has taken notice of KM here at Command and General Staff College (CGSC).

The former Deputy TRADOC Commander and CGSC Commandant, LTG David H. Petreaus, presented the following diagram (figure 5) to CGSC class 007-01 during a formal meeting in the fall of 2006. It succinctly visualizes the ongoing business of the Army in terms of KM and the fact that we are all involved and should be concerned with every aspect of it. KM is every officer's business.
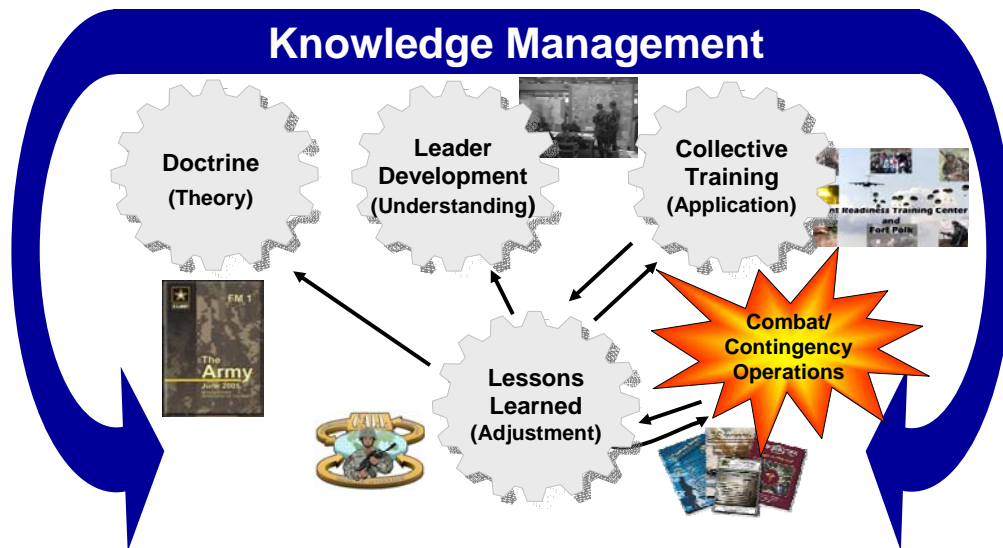
Figure 5.   Knowledge Management
Source: LTG David H. Petreaus' briefing to CGSC class 2007-01, 2006

The general pieces of figure 5 do not talk specifically to the primary question of this thesis, but acknowledges the general idea that KM is the overarching concept of requirements development for the warfighter. The critical process of this KM system is soliciting and eliciting knowledge and information with the warfighters. This is a large piece of the Center's for Army Lessons Learned (CALL) mission and the reason why they are part of the case study for this thesis. One small piece of the big KM process is the requirements development, acquisition, and support of IT for the warfighter.

While talking to some Booz Allen Hamilton consultants whom previously served at the CALL on active duty, it was brought to my attention that the Army has also hired a contractor to develop a KM field manual and creating KM positions at echelons above brigade. The Army has obviously begun to take heed of this critical concept and its power to enable integration. The Battle Command Knowledge System (BCKS) has received recent critical guidance from senior Army staff leadership to get relevant to the fight or

risk losing funding. The Army G3 office briefing at the second annual KM conference in November 2006 laid out clear goals for KM practices in the Army (Krogh 2007, 6).

There are other signs within the Army and other services that the DoD needs to take a serious approach to KM. The *Military Review* journal recently ran an article by LTG John Vines, XVIII Airborne Corps, about his observations, lessons learned, and recommendations base on their 2005 to 2006 rotation (2006, 38). On the fifth page of the article, LTG Vines points out that KM is the first of three key enablers of battle command. "KM is commander's business: it must be operationally and not technically focused, and it must cross all functions" (Vines 2006, 42). In another instance of relevancy, a 2003 School of Advanced Military Studies (SAMS) monograph argues for transforming the core function of military intelligence to KM (Jewell 2003, 3). Jewell argues that "KM with regard to the threat and the environment should become MI's core function while many of its historic collection functions migrate to weapons platform sensors." Additionally, Commander (O-5) John Hearne, former commander of the Carrier Strike Group Ten (CSG-10), knowledge manager and a former member of Task Force Web wrote a recent article in the Department of the Navy's information technology magazine, *CHIPS*. In it, CMDR Hearne talks about how KM afloat gives the warfighter a decisive advantage or knowledge edge. He goes on to say, "KM systematically brings together people, processes and technology to facilitate the exchange of operationally relevant information" (Hearne 2005, 1-2).

Army Regulation (AR) 25-1, *Army Knowledge Management and Information Technology*

The purpose of AR 25-1, *Army Knowledge Management and Information Technology*, is to "establish the policies and assign responsibilities for the management of

information resources and IT. It applies to IT contained in command and control (C2)

systems, intelligence systems, business systems, and (except as noted) national security

systems developed or purchased by the Department of the Army" (US Army 2005, 1). It

goes on to say that the regulation addresses "the application of KM concepts and systems

across the Army, the management of information as an Army resource, the technology

supporting information requirements, and the resources supporting command, control,

communications, and computers (C4)/IT" (US Army 2005, 1).

In reality, the current regulation's policies are outdated, the responsibilities it

assigns are either previously stated or are just superfluous, and it does not even mention

the major KM concepts and systems across the Army today, namely CALL, BCKS,

LandWarNet, or CommandPost. An example of this is an Assistant Secretary of the

Army for Acquisition, Logistics, and Technology (ASA(ALT)) responsibility to "*e*.

Oversee the C4/IT technology base relative to impacts to the Army Industrial Base" (US

Army 2005, 8). One has to immediately wonder what the "Army Industrial Base" is and

whether it could possibly be related to an (military) "industrial complex?" Another

example of superfluous responsibilities is, "the CIO/G-6 will--. . . *l*. Manage and execute

the e-Army/Electronic Business/Electronic Government Programs, including review,

approval, and general oversight of e-Army activities, initiatives, and solutions" (US

Army 2005, 5). Among the hundreds of requirements leveraged against various senior

offices (e.g., 78 for the CIO/G-6 and 47 for the NETCOM), coordination and

collaboration of acquisitions across the Army commands and organizations for IT

warfighting requirements is established, but no methodology of KM is cited. This leaves

the AR 25-1 guidance open to interpretation by the acquisition and development

communities.

In regards to IT acquisition, the regulation refers to ambiguous, "catch-all" terms in establishing policy, like the electronic-Army (e-Army), DOTMLPF analysis, and "Networthiness" (US Army 2005, 35), and obligates only a few senior offices with collaboration or KM of IT acquisitions. One of the initial sections, 1-8 "Army Knowledge Management," talks to the Army's strategy to transform itself into a net-centric, knowledge-based force, but it only skims the surface of the major KM concepts, such as AKO, Communities of Practice (CoP) and the Global Information Grid (GIG).

Moore's Law keeps holding true as technology is getting cheaper and faster (doubling every 18 months), so IT capabilities are becoming more accessible and ubiquitous; however, paragraph 3-4 of AR 25-1, "Process analysis and business/functional process improvement," says that IT acquisitions under $250,000 are exempt from formal doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF) process analysis as long as no significant process changes are associated with the acquisition (US Army 2005, 17). This is a major loophole in the doctrine that does not take into account such inexpensive, but highly effective, transformational technologies as the Buckeye System, WiMAX, police scanners, and commercial GPSs. These capabilities are easily acquired, installed, and operational for much less than $250,000, but the lessons learned, integration, tax stewardship, and requirements development all goes missing because the DOTMLPF process analysis is not required by AR 25-1. There are requirements for capabilities like these to be captured in a registry, the Army Information Technology Registry (AITR), but this requirement is outdated because the AITR is obsolete.

In conclusion, the AR 25-1 (dated 15 July 2005) is an outdated and ineffective regulation for KM and IT, as well as IT acquisition requirements development. This document needs a complete retooling that will make it a relevant and reliable source of true KM guidance. There are a number of good things happening in Army KM, but none of them are found in AR 25-1, only some obscure, ambiguous and obsolete terms, like e-Army and networthiness.

KM and IT Acquisition in the Army or DoD

While the Army and DoD are steadily building a KM focus at the tactical, operational, and strategic level, evidence exists that this is not the case for IT acquisition and sustainment. A recent Naval Post Graduate school thesis calls for an "automated online ordering system to enable rapid acquisition of commercial items and promote time efficiency, reduce administrative costs, and implement cost-effective integrated business practices" (Burris 2006, 77). Major Burris suggests that the Next Evolution eProcurement System-Defense (NEPSD) would have global reach and collection of acquisition information that would enable strategic acquisition and battlefield requirements. This is one piece of the KM concept that is sorely lacking, but is only one aspect of the total KM solution. Other evidence that KM of IT is lacking in the Army is the relatively recent creation of the RDECOM. They were officially stood up on 1 March 2004 because significant money was going to these ten different labs (now under RDECOM) with little if any collaboration and synergy. Some would argue that there still is no collaboration between them, although this is a significant effort to develop Army IT KM.

As pointed out in the first paragraph of this chapter, KM is a discipline--a management of the organization with a particular emphasis of (IT) knowledge. This

axiom holds true in the Army and DoD as it does in the commercial world. In this light, there is no knowing what the specific solution should look like. Indications are that there will not be a revolution in KM applications (a "killer application"), but further possible advances may resemble an Amazon.com-like acquisition and rating engine (Friedmann 2006, 3). For the time being, KM professionals will have to work with and adapt to the larger taxonomies and departments for funding and gradual acceptance (Friedmann 2006, 3).

<div align="center">Summary and Conclusions</div>

In summary, KM is a broad and somewhat confusing concept. Many businesses, large and small, have failed trying to implement KM solutions because they failed to understand all the concepts; however, as Davenport and Prusak stated early in the KM literary culmination, this is not a revolution in management, but common sense and diligence of management (see epigraph)(Davenport and Prusak 1998, 177). The important thing to remember about KM is that it is a discipline more than anything. In this light, it is not the intent of this thesis to suggest a KM solution for Army acquisition, but to introduce the concepts and vernacular in order to frame the context of this thesis and the case studies chosen for it. KM has been a part of the Army for a number of years, but it still struggles with basic concepts and solutions, as will be seen in the next two chapters. This is evident in LTG Vines articulation of the key KM imperatives in his recent article (2006, 42).

In conclusion, there are some clear distinctions in the cognitive states and the types of knowledge that are relevant to this study. These distinctions are useful in framing the questions about the KM of IT acquisition, which will possibly then lead to an

appropriate solution. The next chapter, will contain an explaination the methodology of the analysis as it relates to KM tools for IT acquisition in the Army.

CHAPTER 3

RESEARCH METHODOLOGY

> Fourth generation warfare demands cooperative engagement and tactical agility . . . . Knowledge management is the core capability that enables the warfighting effectiveness and responsiveness of the flexible joint multi-national task forces. (Rear Adm. Michael Tracy, Commander, Expeditionary Strike Force Five 2005, 1)
>
> Herne, John, *CHIPS - The Department of the Navy Information Technology Magazine*

Introduction

This study is an investigation the KM of IT acquisitions that the Army offers. The purpose of this study is to answer the primary question of whether or not the Army is effectively and adequately employing innovative (IP based) KM tools to manage the knowledge of IT development and acquisition practices. To answer the primary question, a case study was conducted of the current innovative Army KM systems and two potential non-DoD KM models for their applicability, efficacy, and suitability for the KM of IT development and acquisition. These KM systems are: Battle Command Knowledge System (BCKS), Center for Army Lessons Learned (CALL), Amazon.com, and BaseOps.net.

Information technology can span a very wide range of equipment, and acquisition can mean different things to different people. For the purposes of this study and in the interest of time, the number of IT items to investigate and the type of acquisition to "little 'a'" purchases is limited, which may include, but is not limited to, unit GSA purchases, unit micropurchases (less than $2,500) on the economy, or personal purchases. The IT

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items of interest to this study are COTS or GOTS IT that serve the full spectrum of war, from tactical to strategic or enterprise.

The tactical items are mostly COTS IT items that soldiers and officers arm themselves with before going to combat or provide a capability that the organic IT equipment cannot, such as: ruggedized laptops, GPSs, satellite phones, cell phones, hand radios, handheld jammers, police scanners, PDAs, or CAC readers. The operational-, strategic-, or even enterprise-level IT items may be GOTS or COTS and run the spectrum of utility, from imagery to wireless broadband capabilities. Examples of these IT items are: wireless broadband (IEEE 802.16/WiMAX), the buckeye imaging system, and ruggedized laptops. In the interest of time, limit the case studies are limited to a few specific items that give a cross section of the current KM of IT acquisition.

Chapter 3 is organized in the logical progression of the analysis. First, the process of gathering the information to address the primary and secondary questions will be discussed. Second, the criteria used to determine the suitability and feasibility of the method, including the criteria used to evaluate each case in the case-study are presented. Finally, a summary and conclusion of chapter 3 are made, with a lead into chapter 4.

<u>Steps Taken to Obtain Information</u>

The first steps taken to obtain information are to conduct thorough research of the contemporary aspects of epistemology (the study of knowledge) and the status quo of the Army's IT KM. Many of the secondary and tertiary questions are asked to establish the baseline of where the Army came from and where it is today. I have done quite a bit of work in this area in the past and have current knowledge of a several current KM systems in the Army for IT acquisition (e.g., the Information Systems Security Program

Application (ISSP)). I have also have a working knowledge of IT development processes and entities in the DoD from previous work with organizations like the Army Research Lab (ARL) and research and development (R&D) exercises such as Horizontal Fusion (HF). Through work as a consultant and as an IT consultant, I have investigated and evaluated a number of IT development and acquisition KM entities.

Many additional steps have been taken for this thesis to further the knowledge of the area of KM of IT acquisition and development, both in the Army and DoD-wide. Other government and commercial resources were investigated, such as technology test labs at the services' labs, NSA, and other major commercial industry leaders, that could lend themselves to possible innovations in IT requirements development, acquisition and tax stewardship. In order to cast a wide net, an extensive Internet search for IT research and development was also conducted. This is how I became knowledgeable on the Army's newly developed RDECOM--and concerted effort to get their arms around R&D in the Army. Additionally, interviews were conducted with Army KM consultants at Booz Allen Hamilton as well as the leadership and technical professions of the four case studies entities.

The analysis in this thesis was performed by conducting a case study of two IP-based KM systems in the Army (BCKS and CALL), one commercial IP-based KM organization, Amazon.com, and a pseudo-military IP-based KM entity, BaseOps.net. These KM applications were analyzed because they afford a tactical level KM capability, and some operational level KM, but they also posses the potential of a strategic capability that could be exploited by the acquisition community as well as the requirements development processes. Through the course of answering the primary question, this

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analysis will determine what characteristics of the system will make it successful, such as: accessibility (bandwidth), structure or format (graphic user interface), copyright and classification management, and server support and maintenance. These systems are inherently managed on a weekly if not daily basis for accessibility, accuracy of information (in most cases), and content.

<div align="center">Criteria to Determine Feasibility</div>

The criteria for determining the feasibility of the method is whether or not is was possible to conduct this case study in six to eighth months and if it would sufficiently answer the primary question. The advisory committee was consulted to make this determination and afford further guidance. They were very helpful in providing direction and assured me that conducting a case study in this manner was both suitable to answer the primary question and attainable in ten months. One reason for this is that both the BCKS and the CALL are headquartered here in Fort Leavenworth, Kansas. The only challenge is to find someone at Amazon.com to correspond with or interview for my case study. The Baseops.net is a KM (model) website that was designed and maintained by my college roommate and current special operations pilot in the Air Force. The sources sought for this thesis are highly credible because the people's positions in their organization were verified and they were spoken to directly.

<div align="center">Limitations and Delimitations</div>

KM is a very wide field of research and analysis, but the thesis scope was narrowed to only the application of KM to the acquisition IT in the Army and DoD. The research of KM for this thesis has been limited to the underlying general concepts that apply to all its applications (e.g., business, medical, financial, or military) and the

emphasis of KM of IT requirements development and acquisition in the Army and DoD.

Within this scope of analysis, the analysis has been further narrowed the scope to

innovative KM tools, such as secure IP based acquisition applications or a VPN

community of interest for IT. Within the scope of the research and analysis, there are

certain things that will not be addressed in my thesis. Examples will be presented of

technology applications that should have or could have implemented KM, but in the

interest of scope and time, not every army or DoD project is evaluated for their

implementation of KM (e.g., advanced collaborative environment (ACE), future combat

systems (FCS), or JTRS program development). I will also not look for or evaluate any

guidance or policies in the acquisition community to implement KM. Additionally, in the

interest of scope and time; I will not evaluate every possible way to acquire IT in the

army or DoD for possible innovative KM solutions. As a matter of practicality, the

determination of the efficacy of an innovative KM solution for IT development and

acquisition based on financial data will not be made in this thesis either (i.e., money

saved by automation and personnel reductions).

In each of the case study analyses, at a minimum, explicit knowledge of three

particular items for specific reasons will be evaluated. These items are the buckeye

imagery system, IEEE 802.16 or WiMAX wireless broadband, and any type of police

scanner. Other IT items of interest than just those mentioned above will be investigated,

but these three in particular are specifically investigated because they have unique

contemporary applications and capabilities.

The first IT capability used to evaluate the Army's KM of IT is the buckeye

system. The buckeye is a digital imaging system that "has 'a zillion applications' for

warfighters" (Miles 2006, 1). It is a deployed service field expedient system developed

by the Topographic Engineer Center (TEC) of the US Army Corps of Engineers'

Engineer Research and Development Center, Alexandria, Va. Installed on an aircraft, this

system can produce real-time, extremely high-resolution, 3-D color maps. It gives ground

commander a bird's eye view of the area in which they're operating. The Buckeye allows

troops to evaluate their operating area from different vantage points in real-time.

Unfortunately, the system has been operational since 1994, but did not make it to the

fight until 2004 (Miles 2006, 2). The Buckeye system program is not a program of record

and "there is quite a bit of discussion, now, about transitioning it to a program of record"

(Kauckak 2006, 1).

The second item used to evaluate the Army's KM of IT is the IEEE 802.16 or

WiMAX wireless broadband capability. This is an internationally interoperable IP-based,

asynchronous wireless capability that has been implemented by many units and garrisons

in the Army. This capability can provide wireless Internet access in the tens of megabits

per second at tens of miles, depending on the environment. One example of this

capability is the 35th Signal Brigade's implementation of it in OIF 3. I consulted them on

buying this capability at the Office of the Secretary of Defenses Horizontal Fusion

program conference. They bought a few boxes, and then ordered more from the theatre.

At one time, they had "more than 40 of these radios maintaining critical command and

control communications links between major enclaves. In most cases they are the primary

communications paths for all data networks. In some cases they are the sole path"

(Parsons 2006, 8). Additionally, Redline Communications, the vendor that sold them

those boxes, has also installed boxes at Fort Bragg, Fort Irwin, Fort Lee, Fort Carson, and

Fort Huachuca. The Special Operations Command (SOCOM) is also working very closely with Redline Communications to implement this capability into their operations. Possibly even more compelling, is the fact that this technology is capable of meeting all the requirements of the $30 billion Joint JTRS program today. This was actually proven in 2004 that with minor adaptations, IEEE 802.16 could "achieve all of the outlined requirements" (Guice and Munoz 2004, 95).

The last IT item used to evaluate the Army's KM of IT is police scanners. I did not know of the utility of these handheld devices in the Global War on Terror (GWOT) until I came to CGSC. In talking with some of my classmates who had been to OIF, I found out that these devices were particularly troublesome because of classification issues with translators. They soldiers were using these items to scan for insurgents talking on their radios in their operating area. Normally, this type of signals intelligence is collected by cleared US intelligence personnel, analyzed, and then pushed down to the pertinent unit. However, savvy soldier where buying these devices online or in their home towns before they deployed, and using them as a tact intelligence capability. They are not usually authorized to do this because the translator has to convert the intercept in real time, and that is not authorized; but, they do it anyway, because it is their life on the line. Additionally, this capability is something that can be found in the overview and capabilities of BCKS briefing (Leners 2007, 32), as an operational security concern because alternative websites to BCKS are talking about these capabilities. If BCKS is concerned about it for OPSEC reasons, then it obviously falls into the KM realm.

Summary and Conclusion

The intent for this case study is to evaluate two current army KM capabilities and two more potential models for KM of IT development and acquisition. In evaluating the KM of IT, I will investigate a range of COTS and GOTS IT items, but will always look specifically for the buckeye, 802.16 or WiMAX, and police scanners. I am very confident in the credibility of my sources and that this study can be completed in the allotted time.

I have conducted extensive interviews and research to provide answers to the secondary and tertiary questions. All of this effort has been a culmination of effort that reaches back six or seven years to projects that I had as an IT consultant and Army National Guard officer. Chapter 4 provides the findings and insights of my efforts over the course of these past busy months, but also years of experience and effort in the field.

CHAPTER 4

ANALYSIS

Warfighting is not the only military activity that requires
great strategy--IT acquisition does, too. (2006, 16)

Mark Tarrallo, *Government Computer News*

Introduction

This study is an investigation the KM of IT acquisitions that the Army offers. The

purpose of this study is to answer the primary question of whether or not the Army is

effectively and adequately employing innovative (IP based) KM tools to manage the

knowledge of IT development and acquisition practices. To answer the primary question,

a case study was conducted of the current innovative Army KM systems and two

potential non-DoD KM models for their applicability, efficacy, and suitability for the KM

of IT development and acquisition. These KM systems are: BCKS, CALL, Amazon.com,

and BaseOps.net.

Chapter 4 is organized in a formal presentation of each case study, followed by

some additional investigations and the answers to the primary and secondary questions.

Through several meetings or conversations, I was able to get answers to all of the

questions that I posed for each case study. I also analyzed several related initiatives and

programs, such as the ASCP and the Information Systems Security Program Application

(ISSP), to determine their relationship and involvement in IT acquisition and KM.

Additionally, I present some examples of acquisitions that could be managed better for

requirements development, tax stewardship, KM, or some combination of these things.

From a list of commercial off the shelf (COTS) and government off the shelf (GOTS) IT items, I have chosen three IT capabilities, at a minimum, to evaluate the Army's KM of IT. For an explanation of their relevance and why these three were chosen for evaluation, see chapter 3. These three technologies are: the Buckeye system, International Electronic and Electrical Engineers (IEEE) 802.16 or wireless microwave access exchange (WiMAX), and police scanners. The applications of each of these technologies spans the range of the levels of war, from tactical to strategic or enterprise. None of them are programs of record, but are very effective and currently highly resourced by the Army, from soldiers in combat to garrisons in CONUS.

CALL

The case study of the CALL consisted of interviewing current and former CALL leadership, studying the CALL consolidated briefings, reviewing the CALL handbook, conducting research on the CALL site databases, and interviewing KM (Booz Allen Hamilton) consultants who work with CALL. I also contacted the consolidated briefing coordinator, Mr. Jim Cline, to attend the day and a half of briefings, but my class schedule would not support that requirement; so I got the briefings from Mr. Cline on a CD and studied them on my own time. The interviews with current CALL staff included several division heads and the deputy director, Dr. Scott Lackey. The Director was not able to meet with me in time to make this study, but I have talked with former directors and deputy directors as well.

General Overview

The 2006 CALL handbook characterizes the CALL as a multimedia operation focused around the CALL website. The website provides global access to a wide range of

information spanning from training exercises to actual operations, from the Vietnam War to the present. Their mission is to collect, analyze, disseminate, integrate, and archive Army and Joint, Interagency, Intergovernmental, and Multinational (JIIM) observations, insights, lessons (OIL) and tactics, techniques, and procedures (TTP) to support full spectrum military operations. The CALL operation runs on a supplemental global war on terror (GWOT) annual budget of $15 million and consists of approximately 200 personnel, including both table of distribution and allowances (TDA) positions and contractors. The headquarters consists of the director, (acting) deputy director, operations coordination center, an executive secretary, and the headquarters section. The active duty senior leadership is staffed by a Colonel (COL), the director, and three Lieutenant Colonels (LTCs). The CALL is composed of six divisions: Operations Coordination Center (OCC), Lesson Learned Integration Division (LLD, depending on the source), Analysis and Integration Division (AID), Research Division (RD), Publication Division (PD), and Information Systems Division (ISD). A couple of these divisions are further divided into three sub-divisions.

The CALL was created in 1985 at Fort Leavenworth, Kansas to capture warfighting lessons coming from the national training center (NTC) and actual combat, like Operation Urgent Fury and Grenada. It was originally focused on the tactical level of war and provided TTPs to units training for desert combat, but conducted its first combat collection in 1989 at Operation Just Cause in Panama. Since then, the CALL has developed into a formal lesson collection organization with the ability to collect lessons from anywhere the US Army executes a combat mission or significant exercise at all levels of war. It also has the unique ability to forward deploy and support the warfighter

with information, 24-hour a day and 365-days a year. The CALL actively supports the AKM plan at all levels of war, but mostly at the operational and tactical levels.

The CALL web service provides global access to multiple searchable databases and repositories of past lessons learned and reports (e.g., CALL archives, lessons learned, handbooks, training and doctrine). In addition to its web services, the CALL provides lessons learned via a number of publications to the joint community, such as handbooks, newsletters, special editions, handbooks, initial impression reports (IIRs), or Combat Training Center (CTC) bulletins. All of these publications and products are fully searchable and downloadable online and accessed from anywhere in the world through one of the CALL websites: unclassified, restricted, or classified (SIPRNET). The information gathered for these publications and postings are gathered through a variety of methods. Additionally, all of this capability is backed up by the Department of Information Management (DOIM) at Fort Leavenworth as a separate location, in case a tornado destroys the location they are in.

KM

The LLD is responsible for various methods and forms of active and passive lesson collection. The CALL generally employs a deliberate method of lesson collection they call direct collection, but has some mechanisms for ad hoc, or indirect, information collection. Additionally, all four CTCs have active and passive collection processes and all units (brigade or larger) are required by AR 11-33 to submit AARs to CALL within 60-90 days, depending on the deployment. The Actual Operations Branch (AOB) of the LLD receives, plans and coordinates collection operations world-wide. The most common deliberate or direct method the AOB uses for collection is deploying Liaison

Officers (LNOs) or by organizing, training, deploying, and supporting collection and analysis teams (CAATs). The general schedule for these CAATs is dictated by the Combined Arms Center (CAC) Commander, and comprises formal visits to division or larger size units by CAATs. They are also deployed when formally requested, but generally require financial support by the requesting unit or organization, and are therefore limited. Indirect collection methods include unsolicited feedback from soldiers and units, information on collaboration web sites, and ad hoc observations from exercises. This information is mostly used to supplement handbooks, IIRs, and newletters, but can also augment requests for information (RFIs) and mobile training teams (MTTs).

The CALL processes for collection, analysis, and presentation are formal and thorough. For example, once the CAAT has collected the information according to their collection plan, AOB helps them develop an IIR. The IIR is subsequently coordinated with the AID for potential changes in DOTMLPF. The AID is responsible for analyzing the OIL from the various collection sources and rapidly integrating lessons learned information into the institutional, operational, and self-development domains. The L2I is a branch of the AID which is responsible for validating DOTMLPF implications from collected information and supports AID actions to resolve and integrate solutions across the Army and JIM communities. AID uses validated issues to propose DOTMLPF solution recommendations and monitors actions until issues are resolved. These issues and implications are coordinated and vetted with 42 analysts or LNOs at the various DOTMLPF entities, such as TRADOC schools, PERSCOM , branch schools and operational units (brigade and above), as well as sister services and departments.

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The information process employed by CALL is a six component system: plan, collect, analyze, integrate, disseminate, and archive. The result of this process is knowledge (lessons and information) that improve the Army's approach to current operations and DOTMLPF. The knowledge that CALL has collected and analyzed can be disseminated for current or future operations either deliberately and actively (e.g., IIR out-brief, request for information (RFI), or directed review) or passively via web services and publications en masse. The litmus test of the CALL's process is whether it improves the mission accomplishment, regardless of type (e.g., operations, training, development).

For the purposes of my research, I studied both the direct and indirect KM processes CALL uses to collect information on the specific topic of IT acquisition. My intent was to determine two questions: what information was, is, or could be collected about the subject of IT?; and, how it might get institutionalized or disseminated for current and future operations? I went about this process in several ways: personal interviews with directors and staff, personal searches on various CALL databases, and assisted searches with senior CALL staff for specific topics.

Findings

The CALL is a very mature and powerful KM tool for the Army and DoD at all levels of war, but is still developing capabilities and relationships. Its systems and services are highly developed, get respect and attention from very senior leadership, and have most importantly, parochial acceptance and integration with the various branches and major commands. The fact that there are 42 CALL (AID) analysts or LNOs (CALL AID 2007, 11) spread across the major entities within the Army, DoD, and Department of Homeland Security is a testament to the successful institutionalization of CALL services,

practices, and support from the Army staff. However, the CALL does have some issues

to resolve and is limited to its supplemental GWOT funding. Some challenges they

currently have are: their databases are not all consolidated and are not all available to the

public, they do not currently have an interface or interaction with any research or

acquisition elements in the Army or DoD, and they do not formally collaborate with the

different branch's publications, such as the Army (Signal Corps) Communicator.

I began my research by trying to familiarize myself with the CALL website

services like a desperate young soldier in the field might, without any training or

introduction. I found that it was fairly easy to navigate, but rather difficult to determine

what search capabilities I was employing--archives, lessons learned, everything? I started

my own simple searches from a .mil computer for lessons learned on the applications or

acquisition of tactical and operational IT (e.g., "wireless," "cell phone," "scanner,"

"satphone," "jammer," "sat phone"). None the less, I am satisfied that I reached a

sufficient level of understanding what topics are not addressed in any of the CALL's vast

databases which span from the Vietnam War until today.

CALL maintains several sources of information (e.g., archives, IIRs, handbooks,

lessons learned) on its public website, but they are not consolidated into a single global

search and one is not available to the public. The CALL collection and observation

management system (CALLCOMS) database and search engine is a significant source of

knowledge that is not available to the public. This is a capability that Dr. Scott Lackey,

deputy director, is hoping to fix. As part of my interviewing process, I later confirmed my

general searches (above) in an interview with the AOB (of the L2D) Director, Mr. Wally.

As we performed global searches on CALLCOMS, Mr. Walley expressed to me that he

has probably read 99 percent of the reports. We searched through the entire CALLCOMS database for: 802.16, WiMAX, wireless communications, commercial off the shelf, and information technology. The only "Observation Detailed Report" that came up for any of these searches was a two part report about lessons learned not being applied consistently across the TRADOC schools. The key word search picked up a phrase about using "information technologies" to enable instructors and student to gather information--not the context of IT that I was looking for. I was rather surprised to find that there was virtually no lessons learned in the entire CALL database pertaining to strategic sourcing of IT, tactical or operational IT purchasing, and personal and micro-purchasing IT.

The very first interview I conducted for my research was with the Information Systems Division (ISD) director, Mr. Ken Vanderpool, who has been with CALL since 1993. Mr. Vanderpool's division "supports the IT systems that provide CALL users the tools to capture produce, and view critical information and knowledge related to the full spectrum of military operations, both past and present. ISD provides system administration support for CALL Web servers and applications unique to CALL, such as the RFI system and CALLCOMS" (CALL 2006, 39). Given Mr. Vanderpool's responsibilities, long history with the CALL, and technical expertise with IT, I felt very confident that he would know about some of the issues I was asking about. One of the primary tasks that Mr. Vanderpool performs is outfitting the CAATs with the IT gear they need to perform their functions effectively, wherever they may go in the world.

When a CAAT team comes in for training on their collection plan, Mr. Vanderpool is responsible for outfitting them with the IT they will need to do their job. Some of the items he issues to CAATs are laptops, PDAs, and either satphones or cell

phones. To his knowledge over the last 14 years, Mr. Vanderpool is not aware of a single report or analysis conducted on one of these IT items. He also expressed to me that he is not aware of any focus in CALL on the lessons learned from IT purchases, the purchases themselves (i.e. how much was spent, what kind of warranty or support comes with it), or the institutional IT from programs of record. He did recall there being two or three acquisition people from another organization within the Army supporting the CALL a few years back, but not presently. Additionally, he inherited some satphones from the CGSC years ago, but they did not come with the encryption key, so he quit issuing them. They are securely stored, but Mr. Vanderpool does not know who purchased them, who is signed for them, nor who is currently paying the service bill even though the service is still active. In the interest of KM and service collaboration, I also asked if he knew of any relationship or interface with RDECOM and he did not. I later verified this fact with the (acting) deputy director and several division directors.

As I mentioned in chapter three, my formal case study involves the investigation of three current tactical to strategic level IT capabilities: Institute of Electronic and Electrical Engineers (IEEE) 802.16 or WiMAX, the Buckeye system, and police scanners. I personally conducted searches from a .mil computer (above) on all three and found nothing. After finding nothing in my preliminary search on the Buckeye system, I submitted an RFI to the CALL online. I received a diligent response from the RFI team within hours and they performed an internal search as well, but found no lessons learned. To help me out, they conducted Internet searches (Google.com) and compiled a handful of articles and reports and also put me in touch with a Mr. Ralph Erwin, National Geospatial-Intelligence Agency (NGA). Mr. Erwin was eager to inform me of the

powerful capabilities and utility of the Buckeye system as well as its origins. On the other topics, Mr. Vanderpool had never heard of IEEE 802.16 or WiMAX, nor did he know of any lessons learned about it. During my interview of the AOB director, Mr. Wally, he did a global CALLCOMMS search on all three items as well and nothing came up there either. One of Mr. Walley's staff subsequently referred me to the signal liaison in AID, Mr. Patrick Shaha, to see if he knew about IEEE 802.16 or WiMAX. He did not and I had to inform him of the implementation of this capability at every level of war, including the Army enterprise. I ultimately found an article that described the success story in the Army Communicator and shared it with both Mr. Shaha and the AOB staff member, Mrs. Nancey Quintero (Parson 2006, 8).

Through the course of interviewing the CALL leadership, conducting internal and external database searches, and researching current CALL materials, I feel that I have sufficiently answered the two questions that I set out to answer in this case study. There is no past or current information or lessons learned about current IT implementations or the acquisition of them in the CALL databases. If a senior officer requested a CAAT on a subject and was willing to finance it, or an RFI (such as mine on the Buckeye system) led to the collection on a subject, then the CALL might have some contemporary IT information in the future. However, simply collecting the information does not provide any level of guarantee that it will be incorporated into the DOTMLPF process either. Additionally, even if IT development and acquisition information was found in the CALL databases, I am not confident that they would be institutionalized because of the report that Mr. Walley discovered about the inconsistent application of lessons learned across TRADOC schools.

Battle Command Knowledge System

In conducting my case study of BCKS, I interviewed the current director of BCKS, COL Jim Galvin, twice, conducted my own research on the BCKS website, studied the 2006 KM conference (held by BCKS) materials and videos, and spoke with KM consultants who work with BCKS.

General Overview

The motto of BCKS is "Share What You Know, Find What You Need." Their website mission statement says, "BCKS supports the online generation, application, management and exploitation of Army knowledge to foster collaboration among Soldiers and Units in order to share expertise and experience; facilitate leader development and intuitive decision making; and support the development of organizations and teams" (us.army.mil 2007b). BCKS has seven objectives: enhance battle command, enhance professional education, facilitate exchange of knowledge, foster leader development, support doctrine development, support lessons learned, and support training. The core competency of BCKS is developing and growing online professional forums or collaborative communities, sometimes called communities of practice.

BCKS was born out of the innovation of two Army majors, Nate Allen and Tony Burgess, who started CompanyCommander.com and PlatoonLeader.org in 2000. These officers recognized the need for soldiers to share critical knowledge that is not available in the Army's aging doctrine and can only be obtained through real-life operational experiences (Slabodkin 2006, 2). The Army recognized the need to incorporate these knowledge networks because they were so heavily utilized and yet privately funded and maintained by these two Army majors. So in 2002, the Army began providing server

space and maintenance support to these websites and then hired Triple-I to develop and implement BCKS in 2004. Ironically, BCKS did not assume control over its founding websites and does not offer a link to them; however, it does provide facilitators and Tomoye software licenses for them at the US Military Academy under their new combined website, "Command Post," at https://cp.army.mil.

Today, BCKS offers several global web services: a repository for warrior knowledge, access to (asymmetric) threaded discussions and forums, and KM training designed to help Soldiers share ideas and seek solutions. These pages are easy to access from Army Knowledge Online (AKO), and from the Internet--simply typing "BCKS" into Google.com returns the top link to BCKS.army.mil. According to Washington State University's WashingtonOnline website, threaded discussions are "simply a chronological listing of people's comments (with their names linked to their comments)" (waol.com 2007). Forum discussions start between users by responding directly to one another within the general topic of a forum. "Threads" to that discussion occur when side discussions or secondary postings result from users diverging from the original general topic of discussion. "A threaded discussion is a group conversation with simultaneous side conversations" (Horton 2001). Asymmetric content simply refers to posted content that is dissimilar in terms of format (e.g., news, blogs, webcast), time, volume, and topics, as opposed to one monolithic format.

BCKS is a minimally staffed, "shoestring," organization of approximately 56 personnel: three active army, 49 contractors, and several permanent or loaned government civilians. The leadership staff of BCKS consists of a COL and an LTC with an annual budget of approximately $10 million. The website and services are managed

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and maintained from the third floor of Bell Hall and backed up every night to the Fort

Leavenworth Department of Information Management (DOIM). Additionally, BCKS was

recently cleared by the Army Knowledge Online (AKO) service providers at Fort Belvoir

to replicate (and backup) their website on their servers. This will give BCKS double

redundancy and special diversity in case a building gets destroyed by a tornado or

hurricane. They do not however maintain the 24-by-365 support that the CALL does, as

their staff is not as large. BCKS makes up for the shortcomings with technology that

virtually supports the servers and scripts 24-by-365 by setting up checks in the software

that will send a message when something is not working properly. The contractor staff,

facilitators and content managers, of BCKS and community experts are also responsible

for maintaining the forums' content and monitoring copyright and classification issues.

They will seek permission to publish or post from authors when required. For

classification issues, the BCKS system constantly performs automatic scans on

documents and looks for classification markings on sites that would indicate an issue.

<center>Knowledge Managment</center>

The BCKS general structure is less formal than that of the CALL's, in both

staffing and design. As mentioned above, its primary means of knowledge transfer is

through asymmetric content and threaded discussions. The website is currently organized

into forty "professional forums" which provide the content and context for different

networks of the Army to connect and converse. The forums range in topics from the

"Strat Leader" forum to the "ARNG CGSC resident ILE net" forum. BCKS quantifies

these networks into four cognitive categories according to the horizontal or vertical

relationship between its users: leader, unit, functional, and special topics. Once the user

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clicks on a forum, the graphical user interface (GUI) takes them to the forum and displays subforums, discussions, and contributions.

The focus areas across the forums and cognitive networks of BCKS are training and doctrine and they maintain a professional and developing relationship with the CALL for KM purposes. In my interview with the director, COL Galvin, he told me that he had just returned from leading a CALL CAAT of the 101st Airborne Division at Fort Campbell, Kentucky. He is very familiar and comfortable with the CALL practices and role today. COL Galvin confessed to an initial minor content infringement issue that happened before he came on station, but commented that everyone has moved well beyond that.

<center>Findings</center>

BCKS plays an important role in the KM of today's globally interconnected Army, but there developmental challenges ahead. While still a fairly young organization (last fall was just their 2nd annual KM conference), it is growing and developing rapidly, it is a high priority to the CAC Commander, and it commands high visibility from very senior Army leadership. There are some challenges being negotiated by BCKS leadership that will make or break the tenure of BCKS in the parochial Army's paradigm. These challenges range from bridging the knowledge gap between the generating and the operating force, to developing a professional and collaborative relationship with the CALL (Krogh 2006, all). In my interview the CALL (acting) deputy director, I learned that BCKS and CALL hold weekly integration meetings. Through the process of my research and interviews, it has become clear that there is no community of practice,

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forum or special network within BCKS, nor external collaboration between BCKS and the Army's research and acquisition communities for IT development and acquisition.

BCKS has opened the flood gates to an endless list of communities of practices and forums that are attempting to connect the Army's knowledge base from top to bottom and garrison to combat zone. Their general challenge at BCKS is to maintain the ability to add value, without losing control of the content and organization of its knowledge base. This is explicitly laid out on slide 6 of LTC Anthony Krogh's "Army KM Strategy" briefing from the 2nd annual KM conference. One example of how BCKS is globally connecting the Army is the response they received over Presidents' Day weekend 2007 from a simulated virtual video. The video of two soldiers manning a checkpoint in Iraq was posted on the NCO Net just prior to the long weekend and engendered over 5,000 hits and over 3,000 visits. This is an example of how BCKS is connecting the Army and building the warrior knowledge base (WKB). Other things that BCKS is working on are an interim KM field manual, developing the WKB's query capability, providing formal training to KM officers, and further developing their working relationship with the CALL.

The symbiotic relationship between BCKS and the CALL is not very apparent and was only revealed to me through interviews with several CALL staff. The CALL deputy director, Dr. Scott Lackey, informed me that the CALL and BCKS personnel hold a weekly integration meeting and that the L2I branch of AID uses the Tomoye software that BCKS employs exclusively. This is a significant fact in the passionate and expensive world of database software, given the limited fiscal resources of both organizations. Additionally, BCKS works with the CALL in conducting CAAT missions, literally and

virtually. COL Galvin recently led a CAAT to the 101st airborne division at Fort

Campbell, Kentucky (fall 2006). The CALL could not provide one of the subject matter

experts (SMEs) to support the trip. Instead of foregoing the questions and information

that the CALL was proposing, BCKS hosted a virtual CAAT via threaded discussion with

the SME at Fort Campbell. Neither party spent any travel funds, the questions were

satisfactorily fielded, and BCKS played a crucial role in making a part of the CALL

mission a success.

One distinctive difference between the CALL and BCKS is the amount of

dedicated resources available to institutionalizing knowledge. The BCKS does not have

the resources that the CALL does for integrating knowledge back into the army force

generation (ARFORGEN) and DOTMLPF processes. The BCKS currently maintains

three or four KM advisors at Fort Lewis, Fort Hood, and Fort Bragg for ARFORGEN

purposes; compared to the CALL's different 42 LNOs or analysts, nearly the size of the

entire BCKS staff. The warrior knowledge base (WKB) is one capability that BCKS

hopes will close the gap. WKB will be a fully searchable repository for all relevant

content, be it: threaded discussion, documents, articles, or books. COL Galvin, BCKS

director, told me that this will require a human in the loop and he is currently looking for

an information assurance (IA) specialist to fill this role. He demonstrated this new query

capability by doing a search on "Buckeye," and it successfully returned a relevant article.

In keeping with my formal methodology for each case study, I investigated the

three IT capabilities: IEEE 802.16 or WiMAX, the Buckeye system, and police scanners.

Prior to my interviews with COL Galvin, BCKS director, I personally conducted searches

from a .mil computer on all three and I found no returns. After mentioning this to COL

Galvin in the first interview, he took the time to conduct a few searches on: "Buckeye," "WiMAX," and "police scanners" (or "GSM900," "GSM 900," "GSM-900"), which were also unsuccessful. As mentioned in the previous paragraph, COL Galvin has since shown me a WKB query tool that returned a relevant hit for the Buckeye system. As I pointed out in the CALL findings section, returning a hit from a general database query is not a legitimate process for institutionalizing knowledge, although it is demonstrable progress from previous queries.

After we looked for a few specific items in BCKS and talked about a whole host of others, COL Galvin recommended that I investigate the LandWarNet eUniversity and see if they offer KM of IT items, such as: personal data assistants (PDAs), commercial global positioning systems (GPS), satphones, common access card (CAC) readers, etcetera. That subsequent investigation is discussed later in this chapter. In my first interview with COL Galvin, I asked if there was any interface with the RDECOM on IT capabilities or requirements. He said optimistically, "very little, if any"--only slightly more promising than that of CALL's relationship. There is one aspect that the CALL and BCKS have in common, and that is that neither one has a dedicated forum or network for institutionalizing KM of IT requirements, development, or acquisition. The BCKS's 40 professional forums and WKB provide a powerful and necessary KM capability to the warfighter, but it does not currently include the KM of disparate IT capabilities and acquisitions.

BaseOps.net

The BaseOps.net website provides US military aviators a global, low bandwidth one-stop-shop for flight knowledge and much, much, more. From its humble beginning

as a personal quest to compile disparate military and civilian aviation Internet sites into one place, it has become a variable one-stop-shop for all things DoD, from do-it-yourself (DITY) moves to global aviation weather. I have known the owner and web master of BaseOps.net for 15 years so I simply exchanged emails and conducted several phone interviews for this case study and did not meet anyone in person. Additionally, I have flown with Army pilots on my way to JTF Katrina in 2005 that were very familiar with and highly complementary of BaseOps.net. They found it difficult believe that the owner and webmaster was my roommate at the Virginia Military Institute.

General Overview

Baseops.Net is the military aviators' interactive, virtual base operations, accessible from anywhere in the world--their motto is "knowledge is power" (baseops.net). "BaseOps," the concatenation of "Base Operations," is the location at every military airfield in the world where aircrews go to mission plan, check weather, and file their flight plans. BaseOps.net primarily provides pilots with the best flight preparation tools, mission planning information, and data available on the Internet in order to aid aircrews in their flight planning and mission preparation. It has evolved and expanded since its original inception eight years ago into a DoD one-stop-shop of information.

The idea of BaseOps.net was realized when his crew was planning a mission from the Persian Gulf to Africa during an Operation SOUTHERN WATCH deployment. Unfortunately, at their remote location, they had little access to flight planning publications, mission planning software, and no military phone lines. At that point they realized that this information must be out there somewhere on the World Wide Web.

After painfully hunting down several different flight planning websites, they were able to plan their mission. Having realized how valuable a consolidated source of critical flight information could become, they made a personal vow to create a flight planning portal at the end of that trip. Baseops began as an accumulation of links to military flight planning websites and resources on the Internet, but now offers information about virtually every aspect of the military, including discounts on IT purchases for military personnel!

BaseOps.net is able to provide all of this knowledge and utility from the limited resources of one man. The owner built and maintains the website completely on his own time and spends less than $200 a year for web host services at a remote location. He has triple redundancy of the website which ensures recovery from anywhere in the world, should the web host be completely unavailable. Having been deployed to far flung places with a low bandwidth connection and desperate for crucial information, BaseOps.net knows the value in a low bandwidth webpage. The fact that BaseOps.net loads quickly, even at low bandwidth, connection speeds go unnoticed by most users because it was designed properly with just good information and no flashy video or images.

Knowledge Management

As a disciple of their motto, "knowledge is power," BaseOps.net provides a wealth of power to its patrons. Evolving from its original design of simply posting Internet flight information and links, BaseOps.net now also offers aviators any conceivable form of electronic interaction: email, threaded discussions, file sharing, blogging, and bulletin boards. It has taken deliberate steps to carefully manage the content and not infringe on copyright laws or terms of use. Additionally, the BaseOps.net patrons have overwhelmingly supported the website the extent that has survived official

Air Force scrutiny and has yet to be supplanted in function by any military services' web capabilities. One only needs to see the commentary at the bottom of the "About" page to know how well it serves an international military aviation community, as well as non-aviators.

BaseOps.net hosts every type of interactive collaboration format possible and has taken serious measures to earn the trust of its users, even the FAA. The website offers all forms of collaboration: threaded discussions, whiteboards, blogs, submissions, email, or archives. On its flyingsquadron.com/forums web page, it hosts 10 forums and a discussion board. Eight of these forums are each facilitated by several community experts who ensure posts are responsible and safe for the various topics, which can number in the mid-thousands. The professionalism and credibility of these forums is exemplified by a facilitator of the "Aviation Medicine" forum, a flight doctor COL in the northern Virginia area. These forums can be very active as well, with some of the replies numbering in the tens of thousands. The owner is also very diligent and knowledgeable in the area of copyright infringement and labels most pages with a statement and a link to their "terms of use" statement. BaseOps.net is very careful about placing links to external sites on a web page and only links to authoritative and reputable commercial websites. Their website is so highly regarded that even the FAA provides a link to it.

Since its original intent was realized, BaseOps.net has branched out in many directions to offer a plethora of knowledge about military life. Some example webpages include: military discounts, personal loans, space available flight info, computer discounts for military personnel, VA loan information, and permanent change of station advice. Each of these webpages goes deeper into its respective subject and offers links,

advice, and crucial information that would otherwise take and individual hours to find in different places on the Internet. All of this knowledge is consolidated and presented in a logical, clean format that is easily navigable and could save patrons hundreds, if not thousands, of dollars. BaseOps.net has expanded its spectrum of knowledge power to almost every aspect of military life, from military healthcare to higher military education.

Findings

BaseOps.net is a contemporary example of innovative real-time KM and proves that knowledge is power when it has been managed properly. This website offers more than just the functionality of both BCKS and CALL (e.g., multiple forums of threaded discussions, archiving, postings, or blogging), it also offers the capability to do file sharing, something that the CALL is hoping to provide soon. Additionally, BaseOps.net manages online sales items and consolidates the multitudes of scattered military websites for every aspect of military life and benefits you never knew you had (e.g. electronics discounts, "full" moving coverage, or free theme park tickets for the whole family). The army and DoD posts a lot good of information in support of its service men and women, but its not useful if it cannot be found. BaseOps.net brings the power of KM to the warfighters wherever they may be in more than just an archived report, threaded discussion, or streaming video skit. One only has to look at the "About" page of BaseOps.net to get a glimpse of the overwhelming gratitude and utility that BaseOps had generated.

The challenge in maintaining a KM tool such as BaseOps.net is keeping it updated and accurate--this is a real-time KM tool. Websites like the CALL have some luxuries in management because the information does not change quickly or often.

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Discounts and deals change frequently and unfortunately, so do some DoD and sister services websites, so that BaseOps.net is constantly working to keep information fresh. It is able to sustain its links in part because its patrons realize the value in keeping this website functioning and remain vigilant in contacting the webmaster when there is a problem or change.

The real power of BaseOps.net is in its knowledge transfer across a diverse range of topics, not just work related topics. From its primary function of providing pilots with tools and information for flight planning and mission preparation, BaseOps.net has extensively expanded the spectrum of its knowledge. For example, it now offers information that influences people's financial power, too, like: VA loans, computer discounts, and hotel discounts. It also offers some select items for sale from various vendors which is tracked and managed for profitability and marketing. This feature is an innovation that could be employed to serve the warfighter and the taxpayer in an official capacity, by tracking sales of items, soliciting feedback on their employment, and sharing that knowledge with the rest of the community.

<div align="center">Amazon.com</div>

Any efficiency gained from the convenient location of the CALL and BCKS and being old friends with the owner of BaseOpS.net were certainly made up for by Amazon.com. After many calls, emails, writing letters, and pleading with people, I finally got a response from the finance director, Jason Warnick, several weeks after first contacting anyone. The nature of the business practices at Amazon does not lend itself to public access and information, but they were reluctant to even verify that their chief technical officer (CTO) was still a man named Werner Vogels.

I contacted Amazon originally by calling the customer service desk because there is no source for corporate background information, other than the investor relations website (amazon.com 2007), which generally consists of news, events, and financial document information. The customer service desk informed me that I must write a letter requesting permission to ask the corporate office questions that it does not already provide information for. This led to a series of phone calls and emails, which culminated in their requirement that I write a letter to the founder and President of Amazon, Jeff Bezos, at Jeff@Amazon.com. Ultimately, this exchange produced no verification of the information I was able to garner from the Internet, to include their own sites. I did find some articles that talk about Amazon's background and progress to date; however, I learned a good deal about their business practices from the owner of BaseOps.net, Rich Hauben. He has been an Amazon.com associate (meaning explained later in this section) since 2002 and can speak to the business practices that Amazon.com employs. After *weeks* of correspondence and pleading, I finally got a response from the finance director. He verified a number of figures, and yes, Werner Vogels is still (as of this writing) a vice president and the CTO, but you will not find that on any *Amazon* website.

<center>General Overview</center>

Amazon.com is characterized as an electronic commerce company, as its business model exclusively relies on the Internet. The company was incorporated in 1994 in the state of Washington, began service in July 1995, and was reincorporated in 1996 in Delaware (amazon.com 2007). "Amazon's initial business plan was unusual: the company did not expect to turn a profit for four to five years. In retrospect, the strategy

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was effective. Amazon grew at a steady pace in the late 1990s while many other Internet companies grew at a blindingly fast pace" (wikipedia.com).

Founded as Cadabra.com in 1994, the online bookstore offered many more titles than the approximately hundreds of thousands that conventional brick-and-mortar and mail-order bookstores could. Jeff Bezos, President, Chief Executive Officer and Chairman of the Board, renamed his company "Amazon" though in 1995 because "Cadabra" sounded too much like "cadaver" and a name beginning with "A" was preferential due to the probability it would occur at the top of any list that was alphabetized--this is an interesting point, pertaining to DoD websites. Jeff names the site after the world's most voluminous river found, which is found in South America. The Internet based business model of a dot-com became a major point of contention for stockholders after the market bubble burst in the last 1990s, but Amazon.com turned its first profit in 2003 (Answers.com 2007). Since Amazon.com's initial public offering (IPO) on May 15, 1997, of $18.00 per share, product diversification and international presence has kept their revenue growing, from $3.9 billion in 2002 (amazon.com 2007) to $10.71 billion in 2006 (yahoo.com 2007), twice that of Ebay.com. Their operating costs for 2006 were $2.1 billion, which left a profit of $8.61 billion last year. On November 21, 2005, Amazon entered the S&P 500 index, replacing the venerable AT&T after it merged with SBC Communications (wikipedia.org 2007).

Today, the Seattle, Washington based company of approximately 13,900 employees which powers and operates scores of websites, enables third parties to sell products on its websites and allows a customer to complete transaction from multiple sellers in one transaction. Websites that Amazon operates include Borders, Waldenbooks,

Virgin, Target, the NBA, Sears Canada, and Bombay Company. Amazon has established

separate websites in Canada, the United Kingdom, Germany, Austria, France, China, and

Japan and it ships globally on selected products. Amazon offers web services for access

to its catalog as well as for integration with retailers like Target and Marks & Spencer.

A9.com provides search engine services directly on the Amazon.com site (wikipedia.org

2007).

Knowledge Management

KM at Amazon.com is an inherent element to all Internet websites, but

Amazon.com is especially prolific at it. It has mastered three key business practices that

have since been copied by many websites. They are: integrating different organizations'

catalogs, enabling consolidated third party sales and expanding market ownership

through associates. They also offer several key information services such as the sales

rank capability, the Listmania service, and a public "wiki" feature for its products.

Amazon.com is a KM goliath that has capitalized very seriously on their ability to

connect a very disparate and broad market with each individual customer who logs in.

According to information in Amazon.com discussion forums, Amazon.com

derives about 40 percent of its sales from affiliates, whom they call "Associates." An

Associate is essentially an independent seller or business that receives a commission for

referring customers to the Amazon.com site. Associates do this by placing links on their

websites to the Amazon homepage or to specific products. If a referral results in a sale,

the Associate receives a commission from Amazon. By the end of 2003, Amazon had

signed up almost one million Associates. Associates can access the Amazon catalog

directly on their websites by using the Amazon Web Services (AWS) XML service.

Amazon was the first online business to set up an Associates program. The idea has since been copied by many other online businesses. "AStore is a new associate's product that gives the power to create a professional online store, in minutes and without the need for programming skills, that can be embedded within or linked to from your website" (wikipedia.org 2007).

Amazon.com sources and sells a range of products to its customers through programs that enable third parties to sell their products on its Web sites. This allows customers to shop for products owned by third parties using its features and technologies and enables individuals to complete transactions that include multiple sellers in a single checkout process. "If you are one of the million retail partners on Amazon.com, if you're this very small bookshop somewhere in southern Florida, your products are immediately integrated into the Amazon.com recommendation system. You also instantly become part of our search system and customers can discover your products the same way they can discover Amazon.com products. All of the Amazon.com platform technologies become available to you as a seller on Amazon.com" (ACMQueue.com 2006). Amazon and its millions of third parties sell various product categories, ranging from its founding product line of books to IT items that soldiers need to take with them into combat, like handheld police scanners and global positioning systems.

What Amazon has mastered so well about KM is the refinement of requirements with the customer in the loop. The Listmania service mentioned earlier is a great example of this. This service produces specialized data that on almost every page is adapted to the specific product on that page and the history of the customer. No direct database access is allowed from outside the service, and there is no data sharing among the services. When

someone accesses the Amazon.com gateway page, the application calls more than 100

services to collect data and construct the page for you (ACMQueue.com 2006). This

capability is something that could be very useful to the Army and DoD as a requirements

development tool of IT acquisitions, whether it is COTS or GOTS IT.

Findings

Amazon.com is proof that knowledge is power and that it can be very profitable.

Although Amazon is a commercial Internet business, it is proof that KM of acquisition or

procurement is a cost effective, legitimate business case for a vast array of consumer

goods, including IT. This is evident in its four year 175 percent growth in revenue and the

fact that many of its features and services are copied by other websites. Even though the

company headquarters was not helpful in my case study investigation, I was still able to

learn a great deal about the power it has harnessed from KM. They also offer capabilities

that the Army could immediately exploit and with little effort--the third party retail

partner program and the associate program. This would afford the Army, and even the

DoD, the ability to have some idea of what IT is being purchased by the force, which

could then be evaluated for requirements development.

In the interest of being consistent, I did perform searches on the three IT

capabilities that I used to evaluate the CALL and BCKS: IEEE 802.16 or WiMAX, the

Buckeye system, and handheld jammers. Since Amazon does not produce anything, is not

a knowledge repository, nor is it affiliated with the military in any way, I did not really

expect to find any of these items, except maybe a jammer. My searches did not return any

IT items for those three, but others did: "smart card reader" garnered approximately 30

CAC-like readers, "GPS" garnered 48 devices, "police scanner" garnered 35 electronic

devices, and "cell phone" garnered 451 actual cell phones available for purchase. The

Army may not realize an instant cost savings or requirements insights by becoming an

associate of Amazon.com, but it could certainly begin to develop an understanding of

what soldiers are buying, what works best, and how much they are spending either their

own money or the government' through micropurchases.

<u>Secondary Investigations--Alternate Case Studies</u>

In my ever-expanding search for the innovative KM tools that the Army might

have already implemented, I have uncovered a labyrinth of IT acquisition integration and

management programs, projects, and centers. In addition to the formal case studies of the

above four web service, these entities proved useful in further answering the primary

question. These seven organizations include: the Army Small Computer Program

(ASCP), the Army Capabilities Integration Center (ARCIC), Information Technology, E-

Commerce, and Commercial Contracting Center (ITEC4), the Defense Business

Transformation Agency (BTA), the Information Systems Security Program Application

(ISSPA), RDECOM, and the Army Program Management Solution (APMS). Each of

these organizations has some vested interest or responsibility in the KM of IT

capabilities, acquisition and integration. In the interest of time and available information,

these entities were not investigated equitably, or to the degree that I did the previous four

formal case studies. However, some pertinent information to this thesis was garnered and

therefore I am including it here.

Army Small Computer Program (ASCP)

My investigation of the ASCP consisted of reading and searching their website

and conducting an interview (via phone and email) with the project director, Mrs.

Michelina "Micki" LaForgia. Mrs. LaForgia and her staff were very thorough and diligent in responding to my questions for this study. She compiled the answers to my questions from her deputy, tech support lead, and herself.

General Overview

ASCP has been designated by the Army Secretary as the Army's commercial center of excellence and primary source for commercial IT (ascp.monmouth.army.mil 2007). The official mission of the ASCP is to "support the Army's Warfighter Network Centric Warfare objectives by developing, implementing, and managing IT contracts that provide comprehensive hardware and software solutions with Enterprise-focused support services within the Army Knowledge Enterprise Architecture" (ascp.monmouth.army.mil 2007). Basically, they support all Army customers' commercial IT requirements - quickly and economically. It is a project of the Program Executive Officer, Enterprise Information Systems (PEO EIS), which was itself only formed in 2002 from the former PEO Standard Army Management Information Systems (STAMIS), the CECOM deputy for systems administration, and the Research, Development and Acquisition Information Systems Activity (RDAISA). The ASCP works diligently with other AKM partners, including the Army CIO/G-6, the Installation Management Agency (IMA) and NETCOM to provide architecturally sound, standards and policy compliant IT enterprise solutions to all Army posts, camps, and stations around the world.

According to their website, the ASCP is the Army's number one source for Information Technology - including hardware, software, and support services (ascp.monmouth.army.mil 2007). They are supported by 31 authorized TDA positions with an annual operating budget of approximately $3.5 million. ASCP's years of

experience conducting market research, negotiation, and continuous contract refresh pays off in the dollar savings and added value they provide the Army community year after year. One process that directly supports the CIO/G-6's strategy for acquiring these devices is the "Consolidated Buy (CB)" Process. Through this program, Army IMA customers gain economies of scale by coordinating their desktop and notebook acquisitions through their local DOIM (or equivalent activity for National Guard and Reserve) IAW AR 25-1. The first CB program in 4Q FY05 saved the Army in excess of $13 million (Boutelle 2006, 1).

In my interview with Mrs. LaForgia and her senior staff, I learned that since the passage of the Clinger-Cohen Act, the Army, as with the entire federal government, has moved from developing systems to procuring commercial items. The use of commercial IT products offered under the ASCP has a direct influence on all levels of war. At the present time ASCP primarily supports the operational level; however, the strategy of the Chief Information Officer (CIO)/G-6 is to leverage ASCP's buying power for the tactical Army. Recent policies such as the CIO/G-6 mandate that "all Army desktops and notebooks" shall be procured through ASCP and will eventually lead to more direct support to the warfighter. The current ASCP mission is to provide commercially available office automation products, software and services. Items such as personal data assistants (PDAs), GPSs, police scanners, satellite phones and even IA products (e.g., firewalls and intrusion detection devices) are outside their currently defined mission scope.

<u>Knowledge Management</u>

KM at the ASCP is very much an internal process, but not exclusively. Their primary focus is to provide the latest commercial office automation products that comply with DoD/Army (particularly NETCOM and CIO/G-6) standards and policy. The ASCP is an enterprise (strategic) level procurement mechanism for the Army, but they do not have the mission of sharing their knowledge with research or acquisition, other than the Army Research Institute (ARI). The ASCP does not work with any Army research centers, does not directly feed into the DOTMLPF process, nor does it have a relationship with the CALL or BCKS. Aside from their primary mission, they do offer useful acquisition knowledge for the individual direct buyer in the form of the government employee purchase program.

The ARI has partially used their services to execute the procurement phase of contracts they developed. As an example back in 1990s ARI had a contract to develop collaboration tools. The result was a combination of various commercial products that resemble what we today consider a typical VTC. Once the system was developed, ASCP marketed the product to Army users. In general however, the ASCP does not directly work with any Army research centers, such as RDECOM, even though Army Materiel Command (AMC) is a major customer and both are subject to the "primary source" guidance of AR 25-1. However, they do monitor evaluations conducted by JITC, TIC, and NETCOM and relay that information to our vendor community so the Army can leverage those findings. Additionally, they monitor communities such as the IPv6 working group and thin client working group. They also do not leverage any of the

commercial and governmental research labs' test results for computer evaluations and functional testing, such as RDECOM or GCN labs.

The ASCP was an active participant in the development of the AKM strategy plan and continues to interface routinely with the CIO/G6 office on changing IT requirements, such as the implementation of Thin Client and IPv6, Common Access Card (CAC) requirements fulfillment, enterprise software initiatives and attendant funding. They do foster the government employee purchase program, which provides an acquisition mechanism for individuals to buy items the ASCP does not sell directly to individuals, such as CAC readers, laptops, and desktops. The ASCP website provides the discount codes that can be used as the specific vendors' websites upon check out.

Findings

In spite of being advertised as the Army's commercial center of excellence and primary source for IT, the ASCP really only offers a narrow niche of infrastructure IT to government buyers, mostly at the enterprise level. Additionally, the project director stated that there is no collaboration for requirements development, product performance analysis, or institutionall integration of the ASCP with the Army's research centers, DOTMPLPF, CALL, or BCKS. The RDECOM, TRADOC Futures Center (now known as ARCIC), the engineer corps' topographical engineering center (TEC), the Defense Advanced Research Projects Agency (DARPA), and a host of other IT centers are diligently spending tax payers' money to meet the warfighters' needs for IT, but the Army's primary source for IT has no affiliation with any of them. This is not a criticism of any of those entities, but a candid observation of the current lack of coordinated KM of IT acquisition.

The ASCP mission is to provide commercially available office automation products, software and services. Since the passage of the Clinger-Cohen Act, the Army, as with the entire federal government, has moved from developing systems to procuring commercial items. Their primary customers are the IMA, DOIMs, RCIOs, Corps of Engineers and, more recently, tactical PMs and units, but ASCP contracts are open to all federal agencies. They boast that the use of commercial IT products offered under the ASCP has a direct influence on all levels of war, but their primary customers usually only purchase enterprise software products. According to the answers from the ASCP project director, ASCP primarily supports the operational level, but the strategy of the CIO/G-6 is to leverage ASCP's buying power for the tactical Army. Unfortunately, items such as GPS, police scanners, satellite phones and even IA products (i.e., firewalls or intrusion detection devices) are outside of their currently defined mission scope.

The ASCP offers some assistance to the individual buyer in the way of discount codes, but does not offer the support of the knowledge they need to be sure they are spending wisely. The soldiers and units are left wondering what the DoD's requirements are for use in DoD facilities (e.g., wireless Internet access) or what types of IT equipment work best (e.g., what brand of CAC reader works best--will not destroy the CAC card in six months). Additionally, there are a lot of IT items that are not covered by this Army's primary source for commercial IT, directly or via a discount code at the vendor website, such as scanners, handheld jammers, gpses, cell phones, or satellite phones.

Training and Doctrine Command (TRADOC) Futures Center,
now the Army Capabilities Integration Center (ARCIC)

My research and investigation has already revealed redundant capabilities and responsibilities among the Army's labyrinth of IT acquisition integration and management programs, projects, and centers. Recently, the TRADOC futures center was re-monikured into the ARCIC. Their focus is oriented on future capabilities, but one of their goals is very similar in function to the mission of the Office of Program Management, Enterprise Infostructure (OPM EI).

"The Futures Center under the Army TRADOC is now developing into the Army Capabilities Integration Center or ARCIC. Secretary of the Army Dr. Francis J. Harvey directed the formation of the ARCIC from the resources of the TRADOC Futures Center under General Order No. 4, effective Feb. 15 (2006)" (globalsecurity.org 2006). The newly designed ARCIC, located at Fort Monroe, Virginia, will develop and integrate the Army's capability requirements and be the lead Army agency for coordinating how best to integrate warfighting capabilities among all the military services and other agencies. According to their website, the "ARCIC designs, develops, integrates and synchronizes force capabilities for the Army across the DOTMLPF imperatives into a Joint, Interagency, and Multinational operational environment from concept through capability development" (arcic.army.mil 2007).

The fourth goal of the ARCIC is to integrate the force. Their "About Us" webpage states that this means to "fully synchronize Joint and Army concepts, architectures, and DOTMLPF solutions for the operating force in conjunction with DA G3 (for prioritization and long-range organizational fielding plans) and DA G8 (to ensure

program supports long-range plans). Integrate DOTMLPF solutions among TRADOC

schools and centers, AMC, and ASA (ALT). Rapidly spiral (and spinout) capabilities and

technologies into the Army Modular Force and back into the developments process to

TRADOC development centers, AMC, and ASA(ALT) for full DOTMLPF integration"

(arcic.army.mil 2007). This sounds very similar to the mission of the OPM EI.

The OPM EI mission is to "design, develop, acquire, integrate, test and field a

world class information technology enterprise infrastructure for the US Army. OPM EI

will form partnerships with government and industry to provide acquisition solutions for

. . . enterprise contracts providing a full range of hardware, software and services"

(fbcinc.com 2007). The primary service that OPM EI provides is the ASCP. So there we

have it--one of the ARCIC's goals is almost exactly the mission of the OPM EI, who's

primary service is the ASCP. The IT acquisition confusion only multiplies from here.

Information Technology, E-Commerce, and Commercial Contracting Center (ITEC4) of

the Army Contracting Agency (ACA)

General Order 06, of 22 August 2002, provided the establishment of the ACA,

effective October 01, 2002. The ACA is a field operating agency that reports to the

Assistant Secretary of the Army for Acquisition, Logistics, and Technology ASA(ALT).

The ITEC4's primary mission to establish master contracts to acquire IT products and

services for the Army Enterprise--not to be confused with the Army's commercial center

of excellence and primary source for commercial IT, the ASCP. According to the ACA's

website, their most important mission is providing efficient and effective contracting

support to Army installations, information technology users, and the warfighters

deployed in contingency environments. To accomplish its mission, ACA established the

ITEC4 for non-tactical/strategic information technology (IT) and commercial items (aca.army.mil 2007).

ITEC4 is the acquisition agency that builds the contracts to satisfy the requirements of its customers: the CIO/G-6, PEO EIS (ASCP), NETCOM, and Fort Huachuca Garrison (three out of four of ASCP's "partners"), but they also provide IT related acquisition support to other Department of Defense customers. In a phone interview with Mrs. Vera Davis, an ITEC4 director and liaison to ASPC, I learned that the ITEC4 satisfies more IT requirements than those of the ASCP, but still only at the enterprise or strategic level. As I have determined in my research, the current ASCP mission is to provide commercially available office automation products, software and services. They do not provide tactical IT equipment, but the ITEC4 apparently does, to some extent. According to one report, ITEC4 acquires specific technology needed in support of the war in Iraq, such as communications equipment, cables, satellite communications devices, fax machines and laptops to deployed troops in the Middle East (McCarter 2003, 1).

The Army's organizational structure for IT acquisition is convoluted and confusing at best. One of the ITEC4 staff confessed that understanding acquisition is akin to understanding rocket science. Despite the confusion of what agency or project is providing what type of IT, the ITEC4 agency has found a very economical acquisition program called strategic-sourcing. The Office of Management and Budget (OMB) issued a policy memo in May 2005 that requires all federal agencies to implement strategic sourcing. An example of this initiative is the expected savings of 20-30 percent of the $50 - $100 million that the Army and Air Force spend on cell phone use (Tarrallo 2006, 1).

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"'Strategic sourcing takes a much deeper dive into understanding (an organization's) requirements, and the market, than traditional procurement . . . [I]t moves procurement from transactional to strategic.' The new cell phone agreements signed under the wireless initiative offer some examples of the benefits of strategic sourcing, Young said" (Tarrallo 2006, 1). As this article points out, this practice has been used in the private sector for more than a decade, but the government has been slow to catch on. The US Government Accountability Office (GAO) seems to keep busy reiterating this fact.

"For many years Federal agencies, particularly DoD, have been publicly criticized for their inability to accurately account for how they spend taxpayer dollars" (SPS Connection 2006b). Information used to take months to work its way up through contracting divisions, activities, commands, service components, DoD and finally to OMB using the old DD350 paper process. Additionally, because DD350 was regarded as an annoying task to be done after a contract was awarded, reports were not only late, but were notoriously inaccurate. I learned from Mrs. Davis that the ITEC4 is now using the Army's new automated system that replaced the DD form 350 process, the Federal Procurement Data System--Next Generation (FPDS-NG). The FPDS-NG is an automated version of the old paper process that sends the contract information directly into the DoD's Standard Procurement System (SPS). To ensure compliance, timeliness, and data integrity, with few exceptions the FPDS-NG "Contract Action Report" (CAR) must be finalized before an award can be released in SPS.

A January 2002 GAO report points out that "principles and practices [for purchasing services at six leading private sector companies] largely reflect a common sense approach toward almost any business venture, that is, providing good leadership,

developing and harnessing knowledge, making sure business processes maximize return, and measuring results" (United States 2002, 7). One of these principles and practices is to obtain improved knowledge on service spending--develop a system to identify how much was spent and analyze the data to reduce costs, improve service, and provide better management (United States 2002, 7). Four years later, another GAO report, "DEFENSE ACQUISITIONS: Tailored Approach Needed to Improve Service Acquisition Outcomes," points out that by establishing "accurate requirements, the customer organization would benefit by involving stakeholders that have *knowledge* about past transactions, current market capabilities and the potential supplier base, and budgetary and financial management issues (United States 2006a, 16). It goes on to point out that the knowledge on spending and workforce is not readily available (United States 2006a, 26).

The investigation of the ITEC4 of the ACA is useful in revealing the fact that KM of IT acquisition is not going well, but the contract accounting system is improving. Additionally, the roles and responsibilities of the various Army acquisition agencies for IT acquisition are still convoluted, at best. In spite of the DoD's establishment of the BTA to lead and coordinate business transformation efforts across the department, my investigation and the latest GAO report confirms that, there is still a severe shortage knowledge pertaining to the acquisition of IT, the requirements analysis of it and what IT is available to the warfighter (see analysis of CALL and BCKS).

<div align="center">Business Transformation Agency (BTA)</div>

The DoD leadership realized that they needed to enhance the support to the warfighter and provide better financial accountability, one of the problems I address in

this thesis. Their solution was to establish a new agency to lead and coordinate business transformation efforts across the DoD. The Deputy Secretary of Defense, Gordon England, directed the establishment of the BTA in a memorandum effective October 7, 2005, and the BTA announced its organizational structure February 3, 2006. The mission of the BTA "is to guide the transformation of business operations throughout the Department of Defense and to deliver Enterprise-level capabilities that align to warfighter needs" (defenselink.mil 2007a). According to their website, "the ongoing DoD Enterprise and Component partnership has resulted in the development of a clearer understanding of the expansive business and financial systems environment of the Department and where opportunities exist to leverage information technology (IT) assets to deliver improved capabilities to the warfighter"(defenselink.mil 2007a).

The challenge of the BTA and the problem I see is the ability to add value by increasing bureaucracy in an already challenged bureaucracy. The best way to improve inefficiencies and financial accountability problems is to change or improve the existing practices and policies and hold people accountable, not by spending MORE taxpayer dollars on staff, office space, electricity, moniker, logo, and websites. Upon further investigation, I discovered that the BTA is not the first business transformation initiative that the Department has undertaken.

Currently, the BTA "frequently asked questions (FAQs)" webpage boasts that, "the DoD Enterprise and Component partnership has resulted in the development of a clearer understanding of the expansive business and financial systems environment of the Department and where opportunities exist to leverage information technology (IT) assets to deliver improved capabilities to the warfighter (defenselink.mil 2007b). However, a

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GAO report on DoD acquisitions released last fall (above) charges that "DoD's efforts to transform its enterprise-wide business operations may not translate into improved knowledge on how services are acquired. The [BTA was] tasked primarily with modernizing key [IT] systems and business processes intended to make reliable data more readily available while at the same time consolidating the overall number of information technology systems and ensure consistency across the department. However, the [BTA] has few ongoing activities directly related to the acquisition of services" (United States 2006a, 21). One organization that has been successful in bridging the knowledge gap between acquisition and requirements is the ISSP.

Information Systems Security Program Application (ISSPA)

As the Communications Security (COMSEC) program manager for the Army National Guard G-6, I was exposed to a number of interesting practices at the NETCOM, good and bad. One of the tremendous successes that I worked with is the ISSPA program and tool. This is the primary program that manages COMSEC and IA items under the Army Planning, Programming and Budgeting Execution System (PPBES). This tool assists the CIO-G6 in determining current and future Communications Security/Information Assurance (COMSEC/IA) requirements. This tool allows for: equitable distribution of limited resources, accurate forecasting during budget processes, and a real-time insight for CIO/G-6 into commanders requirements/needs. The proper management of the ISSPA CIO/G-6 has been able to aid the tactical and strategic commanders in fulfilling urgent and forecasted requirements.

The CIO/G-6 has won the confidence in the field by using the ISSPA for collecting COMSEC and IA requirements. Commanders are now able to identify and

allocate resources under urgent, routine and contingency conditions to include future

requirements up to 15-years through a web based process. Since its conception in

February of 2002, the ISSPA has increased its normal requirements by 584 percent and

its urgent requirements by 47 percent (ISSPA 2006).

The ISSPA program is an Internet accessible tool that is an incredibly successful,

innovative KM tool of IT acquisition and requirements development. A few of the dozens

of these highly desirable, efficient, and effective practices are: it provides current and

tangible information for the Army budget process and the Presidents Budget submission,

aides CIO/G-6 in prioritization of limited COMSEC assets, encourages equitable

allocation of COMSEC equipment, provides an avenue for requesting urgent and

contingency requirements, helps identify Army approved products, provides lifecycle

support, provides customer service through the ISSPA Assistance, provides forecasting to

Tobyhanna Depot for repair and anticipated shipments, and the ISSPA also provides

forecast for New Equipment Training (NET).

US Research, Development, and Engineering Command (RDECOM)

I investigated to see if the Army's latest organizational changes in research and

development involved integrating KM of IT. The RDECOM is the latest subordinate

command developed in the Army Materiel Command (AMC) to meet their mission of

getting the right integrated technologies into the hands of Warfighters quicker. The

Commanding General of the AMC provisionally established the RDECOM on 1 October,

2002 to respond rapidly by integrating, maturing and demonstrating emerging

technologies to field the right equipment, in the shortest time, for the Warfighters.

Headquartered at Aberdeen Proving Ground, Maryland, RDECOM became "official"

March 1. Today, the Army officially created the organization that it intends to be recognized as the world leader in military research, development and engineering.

According to their website, "RDECOM partners with industry and academia to capitalize upon advancing technologies and to develop the next generation of scientists and engineers" (rdecom.army.mil 2007). With a $3.5 billion budget and more than 30,000 military and civilian personnel and full-time contractors, RDECOM is charged with moving technology out of the laboratories and into the hands of Warfighters as quickly as possible. The command seeks out and develops the latest technology to provide the most advanced weapons, communication, clothing, food and vehicles, using 110 direct liaisons to the field, and more than 300 international agreements.

My attempts to contact anyone at the RDECOM were unsuccessful. However, my investigations of the CALL, the BCKS, and the ASCP determined that they do not interact in any regard with RDECOM. In the interest of time and scope, I did not seek out the leadership at RDECOM to ask them about details of their partnerships, programs, and processes. Having asked the major KM and acquisition organizations for IT about their relationships with RDECOM, I am confident that there probably is no formal relationship with or DOTMLPF related connection to RDECOM.

<div align="center">Army Portfolio Management Solution (APMS)</div>

The reason I have investigated this reclusive program is because it is the follow-on or replacement solution for something called the Army information technology registry (AITR). AITR is the Army's single, authoritative registry for IT systems, except it no longer exists as described--it was merged with or supplanted by another registry (US Army 2005, 20). Some time early last year, it was "merged" with the APMS (Dinan

2006, 11). It will continue to maintain the inventory of approximately 3,000 IT

investments and systems from across the Army and produce key reports supporting

external requirements. I initially looked for AITR in AKO, and the only thing I found

from a global search was a text message stating that the AITR functionality is not part of

the APMS. After running several unsuccessful searches in AKO for APMS or "Army

portfolio management solution," I turned to the juggernaut, Google.com, once again.

Google.com, the monstrous search engine that it is, quickly returned some very

high solid returns. The first four (in order) were for the aquatic plant management

society, the alternative provider medical services (British department of health), the

APMS (Australian Internet solutions company), and the aviation performance measuring

system (National Aeronautics and Space Administration). Only after several searches

with searches of the 359,000 returns, was I able to find any hits related to the Army's

portfolio management. I mention all of this to point out something--website name

recognition. If a program needs to be readily accessible by a lot of different people and

organizations, then it needs to be commonsensical, yet unique, so as not to be confused

with a host of other programs, corporations, or charities.

According to a March 2006 briefing on the APMS website (us.army.mil 2007a),

APMS is a single integrated database solution with four primary modules led by a

CIO/G-6 program office. At the time of this writing, this change is 12-months-old and yet

there is no mention of APMS in the current AR 25-1 (15 July 2005), which is 20-months-

old as of this writing. Even more frustrating is the fact that once I finally found the

APMS site in AKO, it would not allow me to access it. I do not know how anyone can

make an entry or retrieve "key reports" if it is not accessible, assuming one can find it.

The disconnect between AR 25-1 and the APMS, the obscurity of the APMS website and its accessibility, and the outdated guidance in AR 25-1 renders the APMS capability and guidance ineffective and broken. I had a hard time even finding it in the CIO/G-6's 500-day plan (October, 2005) and update (October, 2006) (army.mil 2007). I am quite sure that this "solution" would not solicit one dime of capital investment in the commercial business world. This capability looks good on paper, but the fact is that the warfighters and operators of today are already overwhelmed with tasks and information. They are put through countless information assurance requirements just to be able to acquire and implement powerful capabilities like IEEE 802.16, and yet they still have to navigate the Army's web of IT guidance and websites--ASCP, APMS, or AITR. In all of my discussion with active duty and retired KM experts and professionals, and in all my experience as a G-6 program manager and Army Major, I have never heard of AITR or APMS until I read AR 25-1. All of the factors mentioned above are reasons that this program is ill conceived, and needs to be reconciled with the rest of the Army's IT acquisition initiatives and programs.

Study Findings

Primary Research Question: Is the Army adequately and effectively utilizing innovative KM tools for its IT development and acquisition practices?

Despite the numerous changes to policy and organization, in both the Army and the DoD, the KM of IT acquisition, integration, and requirements development at all levels of war and acquisition (strategic and transactional) is piecemealed and severely lacking in quantity and quality. Parochial Army research, engineering, and publications of IT continue to evade a consolidated KM structure that truly realizes the power of KM

and what makes it a combat multiplier. Not only is there no innovative (web-based) KM

tool for IT, but the organizations, programs and tools that the Army and DoD have

initiated do not communicate with each other and many do not feed into the DOTMLPF

system. Despite multiple GAO reports, the IT acquisition contracting systems seem to be

making progress.

Through phone interviews with ITEC4 staff, I learned that improvements are

being made to accurately account for how the Army spends taxpayer dollars. The current

DoD contract accounting system, the Standard Procurement System (SPS), is controlled

by the BTA, but is only in use in Army base operations. "With future versions of the

software, however, the Army hopes to migrate major weapons systems contracting over

to SPS—bringing DoD one step closer to its vision of a truly standardized procurement

system, in use across services, branches, departments, and units" (SPS Connection

2006a). However, the latest of several GAO reports on DoD acquisition points out that

"good information on the volume and composition of service acquisitions is still wanting,

perpetuating the circumstance in which the acquisition of services tends to happen to

DoD, rather than being proactively managed" (United States 2006a, 3).

In my study of KM tools, I found that the CALL has the only developed and

reliable DOTMLPF integration process, but one of its own CALLCOMS reports contests

the efficacy of this process. The BCKS has a handful of liaisons that it coordinates with,

but does not provide the analysis and validation that the CALL does. And neither of these

KM organizations has a role in the KM of IT. Therefore, my study shows that the Army

does not adequately or effectively use innovative KM tool for IT development and

acquisition practices.

Secondary Questions: What is KM? Chapter 2 of this thesis gives a thorough analysis of what KM is and its types, aspects, and components, but I would like to emphasize some points here. The quintessential quip that is often heard regarding KM, "knowledge is power," does not speak to its source--knowledge transfer. Without transferring or translating knowledge between people and organizations, the power is unrealized. This gets to the key consideration of KM for this study, which is integration. KM is the most critical element of integration for any capability, IT or otherwise. If a capability is not accurately identified and well understood, then it obviously will never be properly integrated. KM allows the Army to properly integrate practices, procedures, capabilities, and systems via the DOTMLPF process.

KM gives the Army its ability to become more effective at achieving its missions. This is the reason the Army spends millions of taxpayers' dollars on programs like the CALL, BCKS, APMS, and ACIS. These organizations use KM to integrate practices, procedures, capabilities, and systems into the current operating force and hopefully save money, time, and ultimately lives--the true power of KM. It is this realization that the Army's transformation plan focuses on the integration of IT as a combat multiplier and why KM of IT acquisition is so critical. It becomes even more critical as Moore's Law (technology capabilities will double every 18 months) continues to challenge and confound the acquisition processes.

One last point that I will emphasize here is that KM is about people, not systems. Many corporations and organizations have suffered financially because they failed to understand that fact. The DOTMLPF process is a people process as well, but it relies on IT and software to make institutional changes--tools that people use to perform KM. KM

is not rocket science (Davenport 1998, 1), but a conscientious leadership style of consistent diligence and accountability of accurate knowledge.

What current general KM tools does the Army use? The current formal KM tools that the Army uses are the CALL and the BCKS. Aside from the Army's formal, multi-million dollar, general KM programs, the Army has a number of disparate, branch-specific (parochial) KM tools. Throughout the Army, and DoD, there are some very effective general KM tools, but there is still no solitary website or process for KM. This fact was verified by one of the department directors in the CALL. For this study, I have formally evaluated the Army's two explicit KM tools, the CALL and the BCKS, and a few additional Army and DoD KM tools. The Army Knowledge Online (AKO) web service is a great success story of innovation and operational knowledge collaboration, but it is not the specific type of KM tool that I have addressed in this study. The Guard Knowledge Online (GKO) web service is similar to AKO in that regard.

The CALL and BCKS are two organizations that are closing the gaps in KM in the Army. They coordinate on a weekly basis and are developing a closer working relationship for CAATs and database management. Unfortunately, however, neither one provides a dedicated perspective of current or potential IT capabilities, acquisition, or integration. My case studies found that there is no community of practice or forum in the BCKS for any aspect of IT and the CALL does not have any lessons learned, DOTMLPF recommendations, or dedicated reports for any IT either. BCKS has, as of this writing, just implemented a powerful search tool that returned a search on the Buckeye system, but as stated earlier, favorable search engine results is far from institutionalizing and integrating knowledge.

Aside from the Army's formal, multi-million dollar, general KM programs, the Army has a number of disparate, branch-specific KM tools. The Army has always had its old, parochial KM tools, such as the Engineer Corps' TEC (a KM forum, despite their title) and the Signal Corps' Army Communicator magazine. These organizations and publications serve their niche communities interests, but as we found out in the case of the Buckeye System and IEEE 802.16 (see case studies), they are a disservice to the rest of the Army. As was noted above, the Army currently lacks one solitary repository for information, but it also currently lacks a formal repository for IT knowledge at all. The current AR 25-1 is refers to the AITR, but that has been replaced by the dysfunctional APMS, which is only even remotely referred to in the CIO/G-6's updated 500-day plan.

Acquisition KM tools that exist in the Army are generally convoluted and dysfunctional, as was reported by the GAO, but there are some shining examples of excellence. The ASCP and the ITEC4 have a symbiotic relationship, but neither one provides a formal KM capability. The ASCP does gather and analyze statistics on the products offered under their contracts, but does not aggregate any information with other acquisition entities. Furthermore, they really only currently provide enterprise level hardware and software, do not feed into the DOTMLPF system and do not collaborate with any research and development organizations in the Army for requirements development. As the very recent GAO report points out, there is really no way to know that what we are buying is actually what we need (United States 2006a, 16). There are some aspects of IT KM capability, like the CAC card link and the Microsoft Home Use program, but it is not in their purview. One acquisition program that provides dozens of IT KM capabilities is the ISSPA. However, as mentioned above, none of these

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organizations or programs collaborates or feeds into a solitary repository for requirements analysis, capability integration, or support management.

DoD has several disparate KM tools as well, but they are fairly reclusive and like the Army's, disjoint. The primary source of KM that I have discovered in the DoD is the Defense Acquisition University's (DAU) Acquisition Community Connection (ACC) (acc.dau.mil 2007). The DAU's parent organization, OSD/AT&L, also has hosts the AT&L knowledge sharing system (AKSS). In the interest of time and scope, I did not thoroughly investigate these DoD acquisition KM tools, but I did talk to Pete Zarrella, the lead engineer for technology insertion, Office of the Chief Technology Officer (CTO), Defense Information Systems Agency (DISA). After visiting his community of practice (CoP), DoD wireless KM CoP (my vocational passion) in the ACC, I noticed that there were very few recent postings. Mr. Zarrella verified that his site had gone somewhat stale, as people keep busy with their day jobs and lose interest. Additionally, with so many sites to post things at or have threaded discussions, there is little hope to maintain a dedicated user base. He said the plan is to move the wireless KM site to the DKO so they will have greater user accessibility. Another wireless KM tool that suffers from lack of notoriety is the National Security Agency's (NSA) wireless technology vulnerabilities database (VAPED). This database produces reports on the vulnerabilities associated with each wireless technology or combination of some technologies. I went on the secret Internet protocol router network (SIPRNet) and joined the working group two years ago-- there were six members.

There is no solitary KM tool, in either the Army or DoD, for tactical, operational or strategic level information, regardless of context or scope. There are some effective

KM tools available for particular topics or operations, such as in the CALL or the BCKS, except for IT.

What makes these examples of KM tools effective (e.g., structure, accessibility, classification, management support, or costs)? There are a few key aspects of a KM tool that make it effective, it must be: a reliable source of information (legitimate), accessible from the most remote location or network (accessible), survivable enough to be available 24 x 365 (dependable), and be proactive in finding information, not just relying on people to take time out of their busy day to keep it relevant (assertive). The case studies that I conducted on the four web services (CALL, BCKS, BaseOps.net, and Amazon.com) all have these characteristics, some more robust than others.

Legitimacy is a major issue when it comes to military operations. One of the complaints that I consistently heard in my studies was that BCKS does not analyze the information it is gathering. It is currently working to remedy this and is in the process of developing the WKB. Conversely, the CALL has several teams with military backgrounds working on lessons learned and DOTMLPF recommendations. The information on BaseOps.net is carefully managed by the owner and links to military websites are annotated as ".mil accessible only" if the user needs to be on a military server to gain access. There are differences as well between the threaded discussions on BaseOps.net and BCKS, but only on a case-by-case basis. In at least one case, BaseOps.net has an active duty colonel content manager or facilitator, the same rank as the BCKS director.

One thing that does not necessarily relate to the efficacy of a KM tool is the cost and size of it. The advent of mainstream blogging and threaded discussions (see BCKS

case study) has dramatically improved the software that maintains these virtual forums.

As an example, I compare some of my case study web services. The CALL and BCKS are both operating on a supplemental GWOT annual budget in excess of $10 million, each, in 2006. Amazon.com's operating budget in 2006 was $2.1 billion. Additionally, these three KM web services employ anywhere from 60 (BCKS)--13,900 personnel (Amazon.com). Comparatively, BaseOps.net's 2006 annual operating cost was $200, that's right "two hundred," and employs one person, the owner and webmaster. Comparing the annual cost per person of each of these is dramatic, from $200 at BaseOps.net, to as much as $166,667 at the BCKS. Granted, there is a considerable difference in the services that these four web services provide, but BaseOps.net's web services actually exceed both the BCKS and the CALL in functionality. Not only is BaseOps.Net is a lifeline for military aviators today, regardless of what service or airframe, but also supports and hosts several legitimate threaded discussion boards, blogs, bulletin boards, and offers file sharing, something that CALL is only now considering. Additionally, BaseOps.net is an Amazon.com associate and offers some recommended gear on the site.

Dependability and accessibility are not common attributes of military websites, but they are present in my four web services case studies. The military and pseudo-military web services that I investigated all enjoy a sufficient level of accessibility. The BCKS and the CALL are accessible via the Internet, as is of course BaseOps.net. The name, "Amazon," was aptly chosen and has truly become synonymous with voluminous Amazon River. Jeff Bezos, Amazon.com President and CEO, changed the name from "cadabra.com" for its alphabetical priority and its memorability. Additionally,

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Amazon.com tests its reliability every week by simulating a data center being destroyed. They do this so they are assured that users have 24x365 access, orders are not dropped, and the sales keep flowing. The military web services I investigate, the CALL and the BCKS, both have redundant back-up files for their system through their local DOIM (see respective case studies). BaseOps.net has a triple redundant back-up system as well. Without going to the burden of conducting an investigation, I have heard enough horror stories in the past two years to know that many DoD websites are not as dependable as they need to be.

The last attribute that I found makes a KM tool effective is its assertiveness. The business of KM is a two way street, and it requires control measures like street signs. The CALL network does this extremely well because they have the staff and funds to support it. They are constantly pushing out CAATs, collaborating with the operational environment, and integrating lessons into the DOTMLPF. Other websites, like the DAU's ACC do not and have paid the price. The BCKS and BaseOps.net threaded discussion forums have enjoyed a lively existence, but it is solely dependent on the participation of its constituents. Without having investigated, I am sure that some of the forums have waned in participation to the point of irrelevance. I have seen it myself on the "ARNG CGSC resident ILE net" forum in the BCKS. To survive the test of time, a KM tool needs to have an assertive aspect to it, so that it is initiating some knowledge transfer, regardless of the free time of its constituents and customers.

What types of KM systems and processes is the Army currently using for IT? AR 25-1 states that the AITR is the Army's single, authoritative registry for IT systems, but it no longer singularly exists. The only formal KM system or process in the Army that I

was able to identify was the APMS, which absorbed the AITR (see alternate case study above). Furthermore, after an arduous search in AKO, I finally found the APMS website, but it was virtually useless. I could not figure out what utility this website was providing, especially because it would not let me login to its portal. I believe there is some level of KM going on inside of the ASCP and ITEC4 programs, but they admitted that they do not collaborate with Army research organizations, feed into the DOTMLPF, or use the products from commercial and pseudo-military labs (e.g., GCN labs). They do advertise their requirements (well, we hope they would) and monitor some technical working groups, such as the IPv6 working group.

One program that is contributing to the integration of IT capabilities in the Army is the ISSPA. This database is a remarkable capability that should be the model for all IT acquisition programs or systems. They application is web accessible and tracks what is bought and by what unit, how much was spent, predicts future requirements, and the program liaises with the commercial sector for new products. It resides at NETCOM, the partner and customer of both the ASCP and ITEC4, so one would think they have some kind of relationship, but they do not.

Based on the repetition of the GAO's reports on insufficient acquisition data management and requirements development across the DoD and my own investigations, I am confident that there is a severe lack in capability here. Additionally, as pointed out in the latest GAO report, the DoD's newly minted BTA has yet to produce results to substantiate the bureaucracy that it has brought to the department. I talked with several of their leadership at the FOSE 2006 conference, and all I heard about was the eSF44 initiative--an online version of the local contracting recording system . . . revolutionary.

What IT information would be useful to the acquisition and operational community? Time and scope did not afford me the resources to research and investigate this question as much as I had hoped. Nonetheless, the 2002 GAO report on DoD acquisition presents four broad principles that were critical to successfully carrying out the strategic approach of the companies' they evaluated (United States 2002, 7). Additionally, one of my interviews with a Booz Allen Hamilton KM consultant revealed the diamond concept of "the fusion of innovation." Imagine a diamond and each point is one element of innovation: capability, reliability, acquisition process, and the network structure or geography. These elements of innovation are what the acquisition community needs to know and what the 2002 and 2006 GAO reports recommends the DoD remedy. There is very little, if any, sufficient data to know that the Army of DoD is buying the right IT for the right mission. KM is the key to this problem.

What military and civilian technology research is available for strategic, operational, and tactical personnel to leverage? There is a plethora of military and civilian technology research available at all levels of war. The military is constantly conducting exercises to evaluate new capabilities, such as the Coalition Warfighter Integration Demonstration (CWID), the Quantum Leap exercise of the Horizontal Fusion Portfolio, and Combined Endeavor. Additionally, the RDECOM's intends to be recognized as the world leader in military research, development and engineering. This $3.5 billion command is charged with moving technology out of the laboratories and into the hands of Warfighters as quickly as possible. There are also the branch specific labs like the TEC. If anything, there may be too much research going on in the military and not enough

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return on investment in the form of capability. This is evident in the unpopularity of programs like the VAPED and the demise of the Quantum Leap exercise.

The commercial world is producing even more technology research results than the military, on every conceivable technology. Even magazines like *Government Computer News* has its own lab that it uses to evaluate over a dozen characteristics of ultralight notebooks (Breeden 2006, 36), the ruggedization of several different IT items for special forces' and general military use(Breeden 2007, 30), or the energy efficiency of desktop workstations (Breeden and Crow 2006, 42). GCN even published a technology acquisition buyers' guide article, called "In the know" (Essex 2006, 26)--what do you know!?

<u>Summary and Conclusion</u>

In summary, this chapter is a comprehensive investigation of not only the four web services of the formal case study, but also a variable degree of investigation into an additional seven various IT acquisition and research programs and offices within the Army and DoD. In performing the formal case study, I conducted numerous interviews in person with the CALL and BCKS staff, conducted phone interviews and corresponded via email with the BaseOps.net owner and webmaster, and researched and corresponded via email with several staff at Amazon.com. Additionally, for the alternate case studies, I either conducted phone interviews with staff, researched the current website of the organization, corresponded with staff via email, or some combination of these. Having researched and evaluated eleven KM and IT acquisition or transformation management organizations, I have been able to come to some confident conclusions about the status of the KM of IT acquisition, integration, and requirements development.

Despite the numerous changes to policy and organization, in both the Army and the DoD, the KM of IT acquisition, integration, and requirements development at all levels of war and acquisition (strategic and transactional) is piecemealed and severely lacking in quantity and quality. Parochial Army research, engineering, and publications of developing IT continues to evade a consolidated KM structure that truly realizes the power of KM and what makes it a combat multiplier. Not only is there no innovative (web-based) KM tool for IT, but the organizations, programs and tools that the Army and DoD have initiated do not communicate with each other and only one of the eleven I investigated feeds into the DOTMLPF system. The IT acquisition contracting systems seem to be making progress in tax stewardship, but the latest of several GAO reports on DoD acquisition points out that "good information on the volume and composition of service acquisitions is still wanting, perpetuating the circumstance in which the acquisition of services tends to happen to DoD, rather than being proactively managed" (United States 2006a, 3).

The following list is a consolidation by category of conclusions about current KM of IT in the Army for:

Developing IT capabilities or lessons learned

General Army and DoD KM is piecemeal and time consuming.

There are at least half a dozen major Army knowledge centers (e.g., CALL, BCKS, LandWarNet, Command Post, ATEC knowledge network), with sometime redundant and unvetted information, where soldiers and officers must search through topics or information to get contemporary TTPs and lessons learned. In one very ironic instance, the genesis websites for BCKS (companycommand.com and

platoonleader.org) are not currently connected to or linked with the BCKS; they reside under a different KM network, "Command Post," at West Point, New York. Additionally, disparate legacy KM tools, such as publications, research papers and websites, are scattered and hard to locate, unless the researcher knows exactly what IT capability they are looking for. Junior officers and soldiers are becoming more and more Internet proficient every year, but unless they have a battlebook of IP addresses, there can be no reasonable expectation on them to know where to find all of the knowledge that the Army spends millions of dollars capturing.

No consolidated, reliable repository for institutional knowledge of IT exists.

The APMS has supposedly superseded the AITR, which required reporting per AR 25-1, but it is barely even mentioned in the CIO/G-6's 500-day plan (and update) and the APMS website is dysfunctional for many reasons. Neither the CALL nor BCKS have a focus on IT capabilities and lesson learned. The LandWarNet eUniversity-Signal might have limited capability.

Army acquisition and development organizations do not consistently and proactively collaborate with each other or industry to identify capabilities and vulnerabilities of IT they acquire.

There is a wealth of IT information available and the time is long gone that the Army can sit back and wait for industry to come clamoring to them. The NSA's VAPED, the SDR forum, the WiMAX forum, GCN Labs and others previously cited are examples of readily available government and commercial IT knowledge sources that are not regularly engaged by the Army. The enemy is exploiting our own technologies against us faster than we can develop new ones to defeat them, and at no overhead cost. As

previously mentioned, previous DoD and Army projects JTRS, SGT York, and ADA all

share the same failures of KM and result in technological quagmires, if not a

contemporary military industrial complex (MIC) like the JTRS program. None of the IT

acquisition organizations in the Army (e.g., ITEC4 or ASCP) or DoD currently

coordinate with the research and engineering development offices and organizations,

such as RDECOM, the Army Test and Evaluation Command (ATEC), the TEC, for

lessons learned and capabilities (e.g., Buckeye system, IEEE 802.16, or wireless PDA's).

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as the NSA's VAPED, SDR Forums, the WiMAX forum, or the GCN labs.

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lessons learned and capabilities (e.g., Buckeye system, or IEEE 802.16).

No knowledge center exists of COTS and GOTS IT to provide vendor

recommendations, capabilities and limitations, best practices, recommendations, support

or warranty information, or personal discounts. The ASCP website provides some vendor

discount codes for CAC readers and computers, but does not provide (publicly available)

recommendations for capabilities, requirements, or reliability.

The Army and DoD spends much more than industry on the web services it

provides.

Similar to Moore's law for hardware, web service capabilities are becoming more

powerful and efficient every year. BaseOps.net is proof that the multi-million dollar web

services the Army and DoD do not need to be so resource intensive. The advent of secure commercial web services means that websites like BaseOps.net can offer *more* web services than either BCKS or CALL at 0.1 percent and .001 percent the annual cost per person--granted these Army KM sites provide more human functionality, but does it justify the cost? Not only does the one owner and operator of BaseOps.net provide more web services functionality at fractions of the cost, but it is the lifeline of the Army and Air Force flight planning community, consolidates a wealth of disparate general DoD information, and offers recommendations on excellent COTS IT gear--something that no Army or DoD website currently does.

IT acquisition (tax stewardship)

The accounting systems for IT acquisitions only exist at the strategic level. Their websites are improving, but only after multiple GAO reports and public scrutiny. A recent Naval Postgraduate School Thesis notes, "The DoD should develop and adopt a next evolution eProcurement system that . . . should replace the current Procurement Desktop-Defense (PDD) contract writing system" (Burris 2006, 78).

No accounting system exists to aggregate micro- and personal purchases of *all* COTS and GOTS IT products (e.g., GPSs, police scanners, handheld jammers, laptops, wireless routers, CAC readers, or PDAs).

No single source of COTS and GOTS IT exists to provide economies of scale down to the tactical or transactional level.

IT integration (requirements development)

Develop a common operating picture for Army and DoD IT development, acquisition and integration.

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Be more honest and accurate about the true role of the acquisition and integration functions of the various IT development, acquisition and integration organizations in the Army.

The strategic (enterprise) level acquisition systems that exist do not currently feed into the DOTMLPF system for the institutionalization of requirements in the Army or DoD. Two significant technologies (802.16 and Buckeye) have evaded and institutional knowledge, lessons learned or the DOTMLPF system.

No transactional (tactical and operational) level, Amazon.com-like acquisition system exists to provide insight of unit and individual micropurchases or personal purchases. Recent Naval Postgraduate School Thesis notes, "The DoD should develop and adopt a next evolution eProcurement system which . . . should replace the current Procurement Desktop-Defense (PDD) contract writing system" (Burris 2006, 78).

None of the IT acquisition organizations in the Army or DoD coordinate with the research and engineering development offices and organizations, such as RDECOM, ARL, the Center for Innovation Lighthouse, the Topographic Engineering Center (TEC), for requirements development (e.g., Buckeye system or IEEE 802.16).

Based on the investigation in this chapter, there are some practices that the Army and DoD could implement to provide the KM of IT. As is pointed out in Chapter 2, KM is not so much about systems and software as it is about common sense and management with a focus on knowledge. Likewise, the January 2002 GAO report points out that "principles and practices [for purchasing services at six leading private sector companies] largely reflect a common sense approach toward almost any business venture, that is, providing good leadership, developing and harnessing knowledge, making sure business

processes maximize return, and measuring results" (United States 2002, 7). In the next

chapter, I will make some conclusions about my research findings and make

recommendations based on the case studies of this chapter.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

> A good company idea . . . is likely to remain confined to
> one company indefinitely, even though it would be of benefit to the
> whole military establishment. (1947, 113)
>
> S. L. A Marshall, *Men Against Fire: The
> Problem of Battle Command*

Introduction

To answer the primary research question, a case study was conducted of the current innovative Army KM systems and two potential non-DoD KM models for their applicability, efficacy, and suitability for the KM of IT development and acquisition. These KM systems are: Battle Command Knowledge System (BCKS), Center for Army Lessons Learned (CALL), Amazon.com, and BaseOps.net. The result of the research and case study investigations was an overwhelming lack of KM in the Army for IT development, acquisition, and integration. The KM organizations in the Army do not collaborate with their own acquisition counterparts and neither of them collaborates with the development community. Additionally, the general KM that the Army does implement is far too piecemealed and disparate to be an efficient and accurate source of knowledge in the contemporary operating environment.

Chapter 5 is organized in a review of the findings of the case studies that were performed, an interpretation of the findings, and the subsequent recommendations. Additionally, there were some realizations about what further studies should be conducted and possible ways that this study could have been done differently.

<u>Summary of Findings</u>

Despite the numerous changes to policy and organization, in both the Army and the DoD, the KM of IT acquisition, integration, and requirements development at all levels of war and acquisition (strategic and transactional) is piecemealed and severely lacking in quantity and quality. Parochial Army research, engineering, and publications of developing IT continue to evade a consolidated KM structure that truly realizes the power of KM and what makes it a combat multiplier. Not only is there no innovative (web-based) KM tool for IT, but the organizations, programs and tools that the Army and DoD have initiated do not communicate with each other and only one of the eleven that were investigated (the CALL) feeds into the DOTMLPF system. The IT acquisition contracting systems seem to be making progress in tax stewardship, but only at the enterprise level. The latest (2006) of several GAO reports on DoD acquisition points out that "good information on the volume and composition of service acquisitions is still wanting, perpetuating the circumstance in which the acquisition of services tends to happen to DoD, rather than being proactively managed" (United States 2006a, 3).

The following list is a consolidation by category of conclusions about current KM of IT in the Army for:

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There are at least one-half dozen major Army knowledge centers (e.g., CALL, BCKS, LandWarNet, Command Post, or ATEC knowledge network), with sometime redundant and unvetted information, where soldiers and officers must search through topics or information to get contemporary TTPs and lessons learned. In one very ironic

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instance, the genesis websites for BCKS (companycommand.com and platoonleader.org) are not currently connected to or linked with the BCKS; they reside under a different KM network, "Command Post," at West Point, New York. Additionally, disparate legacy KM tools, such as publications, research papers, and websites, are scattered and hard to locate, unless the researcher knows exactly what IT capability they are looking for. Junior officers and soldiers are becoming more and more Internet proficient every year, but unless they have a battlebook of IP addresses, there can be no reasonable expectation on them to know where to find all of the knowledge that the Army spends millions of dollars capturing.

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faster than we can develop new ones to defeat them, and at no overhead cost. As previously mentioned, previous DoD and Army projects JTRS, SGT York, and ADA all share the same failures of KM and result in technological quagmires, if not a MIC like the JTRS program. None of the IT acquisition organizations in the Army (e.g., ITEC4 or ASCP) or DoD currently coordinate with the research and engineering development offices and organizations, such as RDECOM, the Army Test and Evaluation Command (ATEC), the TEC, for lessons learned and capabilities (e.g., Buckeye system, IEEE 802.16, wireless PDAs).

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Similar to Moore's law for hardware, web service capabilities are becoming more powerful and efficient every year. BaseOps.net is proof that the multi-million dollar web

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services of the Army do not need to be so resource intensive. The advent of secure commercial web services means that websites like BaseOps.net can offer *more* web services than either BCKS or CALL at 0.1 percent and .001 percent the annual cost per person--granted these Army KM sites provide more human functionality, but does it justify the cost? Not only does the one owner and operator of BaseOps.net provide more web services functionality at fractions of the cost, but it is the lifeline of the Army and Air Force flight planning community, consolidates a wealth of disparate general DoD information, and offers recommendations on excellent COTS IT gear--something that NO Army or DoD website currently does.

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No single source of COTS and GOTS IT exists to provide economies of scale down to the tactical or transactional level.

IT integration (requirements development)

Develop a common operating picture for Army and DoD IT development, acquisition and integration.

Be more honest and accurate about the true role of the acquisition and integration functions of the various IT development, acquisition, and integration organizations in the Army.

The strategic (enterprise) level acquisition systems that exist do not currently feed into the DOTMLPF system for the institutionalization of requirements in the Army or DoD. Two significant technologies (802.16 and Buckeye) have evaded institutional knowledge, lessons learned or the DOTMLPF process.

No transactional (tactical and operational) level, Amazon.com-like acquisition system exists to provide insight of unit and individual micropurchases or personal purchases. Recent Naval Postgraduate School Thesis notes, "The DoD should develop and adopt a next evolution eProcurement system which . . . should replace the current Procurement Desktop-Defense (PDD) contract writing system" (Burris 2006, 78).

None of the IT acquisition organizations in the Army or DoD coordinate with the research and engineering development offices and organizations, such as RDECOM, ARL, the Center for Innovation Lighthouse, the Topographic Engineering Center (TEC), for requirements development (e.g., Buckeye system, IEEE 802.16).

<u>Interpretation of Findings</u>

What Do the Results Mean?

The results of the analysis in chapter 4 mean that there are a number of significant improvements that need to be made to the Army's and DoD's current KM policies and procedures. Not only is the information that needs to be captured and the knowledge that needs to be managed increasing in type and volume, but it appears that the type and number of tools that the Army is applying are increasing as well. This only serves to

confuse and frustrate the warfighters who are trying to get quick and effective solutions

to their warfighting requirements. Additionally, there is a significant lack of formal KM

with regards to IT acquisition, integration, and requirements development. Despite

significant, costly efforts of the Army to transform their business practices to be more

effective and responsible, there are still several simple, but major, changes that could be

made in the interest of general KM, specifically the acquisition, integrations and

requirements development of IT. Not only does my research show this, but the GAO has

made similar conclusions as recently as November, 2006.

<center>What Are the Implications?</center>

The Army has a number of redundant, uncollaborative and parochial acquisition

KM, development, and integration processes and organizations that contribute to serious

implications. The implications of these findings are significant and could save not only

hundreds of thousands of tax dollars, but possibly the lives of our highly trained and

dedicated warfighters--the definition of a combat multiplier. Some priority implications

are: warfighting requirements are not met early as they could be; lifesaving knowledge

that could not be found is not shared; millions, if not billions, of tax dollars are wasted

developing a capability that exists in the commercial world. For presumably the first time

in the history of the DoD budgetary process, the former chief of staff of the Army,

General Schoomaker, failed to submit the Army's budget plan to the former Secretary of

Defense, Donald Rumsfeld, by the deadline in August, 2006. No government agency can

truly financially die, but as former Secretary of Defense Rumsfeld pointed out,

"successful modern businesses are leaner and less hierarchical than ever before. They

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reward innovation and they share information. They have to be nimble in the face of rapid change or they die" (Donald H. Rumsfeld, 10 September, 2001).

<div align="center">Unexpected findings</div>

Through the course of my analysis, there were two primary findings that were unexpected and somewhat shocking. First, I did not expect to find such a complete void of the KM of IT in the Army's premiere KM organizations, the CALL and the BCKS. The majority of my total time conducting these case studies went to interviewing the leadership at these two renowned organizations. They are very proficient and dedicated to what they are doing, but there is a complete lack of information or knowledge regarding IT capabilities, integration, and acquisition. Second, there is a complete disconnect between the IT acquisition community and the DOTMLPF process. The IT acquisition community's contracts are limited to a very narrow niche of IT at the strategic and enterprise level. There is a significant amount of knowledge, stewardship, and support for personal or organizational (tactical or operational level) IT capabilities that goes missing every day and is never fed into the DOTMLPF process.

Based on the investigation outlined in chapter 4, there are some practices that the Army could implement to improve general KM and to provide for the KM of IT capabilities, acquisition, and integration. As is pointed out in chapter 2, KM is not so much about systems and software as it is about common sense and management with a focus on knowledge. Likewise, the January 2002 GAO report points out that "principles and practices [for purchasing services at six leading private sector companies] largely reflect a common sense approach toward almost any business venture, that is, providing

good leadership, developing and harnessing knowledge, making sure business processes maximize return, and measuring results" (United States 2002, 7).

<u>Recommendations</u>

This chapter will make candid recommendations to the specific findings described above. I can only hope that my efforts conducting this study will be of some utility to the senior leadership interested in averting those implications described above. It is Army field manual (FM) 1-0 which states, "when large, complex organizations pursue transformational change, a key measure of success is leaders' ability to reorient peoples' attitudes and actions" (United States 2005, 4-9). Information technologies are developing faster and faster every year and the Army no longer has the luxury of leaving IT development, acquisition and integration to the bureaucratic and cold war processes of yesterday. The latest *Quadrennial Defense Review* (*QDR*) confesses that, "still encumbered with a Cold War organization and mentality in many aspects of department operations, the Department will seek new and more flexible authorities in budget, finance, acquisition and personnel. Now is the time to institute still further changes necessary for the 21st century" (*QDR* 2006, ix).

Army transformation is synonymous with KM in that the concept is more accurately described as a leadership or management approach, than merely the implementation of a technology solution. "Army transformation is more than materiel solutions. Adaptive and determined leadership, innovative concept development and experimentation, and lessons learned from recent operations produce corresponding changes to [DOTMLPF]. DOTMLPF is a problem-solving construct for assessing current capabilities and managing change. Change is achieved through a continuous cycle of

adaptive innovation, experimentation, and experience" (United States 2005, 4-3). With this in mind, my recommendations follow each of the findings derived from chapter four, by general category:

Developing IT capabilities or lessons learned

A. General Army KM is piecemeal and time consuming for warfighters and organizational leaders.

My studies have shown through interviews with senior Army KM leaders and research of recent publications that there are too many places for soldiers and officers to have to research in order to get the latest information. Until approximately 2000, the Army's CALL was the only KM entity in the DoD. Now, every organization in the Army has some type of online KM medium. As the DAU's dormant Acquisition Community Connection (ACC) site found, there are too many threaded discussions and blogs in the world vying for peoples' time, in addition to their daily work, to make multiple websites sustainable. Additionally, the Army appears to be approaching the problem of rampant knowledge by adding new KM personnel to units at the operational and strategic level. I have several recommendations to alleviate these problems and which "nest" (correlate) with other recommendations to follow.

1. In the interest of time, resources, and confusion, eliminate redundant programs and forums, such as the "Command Net" in BCKS and the entire Command Post site (e.g. commpanycommander and platoonleader), and consolidate all major knowledge centers and organizations (e.g., CALL, BCKS, and LandWarNet) in the Army under one legitimate, memorable, and accessible website with the appropriate variety of communities (e.g., XO/S3, Company Commander, Platoon Leader). It is frustrating, and

yet comical, to know that the very genesis of BCKS, now Command Post, is not even deconflicted from the multi-million dollar BCKS. At the time of this writing, BCKS has 41 forums, with some forums comprising as many as 24 (sub-forums) communities. Likewise, Command Post has 10 forums (they call them communities), with as many as 14 sub-forums. The aggregate of these two forums comprises approximately 1,124 sub-forums that cannot possibly be adding value and deconflicted on a regular basis. The operational community is arguably the most disadvantaged and critical audience, but they do not have the time it takes to peruse the thousands of sub-forums that exist for each field.

This dispersion across multiple websites equates to increased searching and synthesizing time of the army's soldiers and officers, which in turn means wasted tax dollars. They need to be consolidated under one, easily remembered and relevant URL, such as "knowledge.army.mil," "knowledgemanagement.army.mil," or "km.army.mil." Just as Amazon.com has become synonymous with virtually any consumer product under the sun, service members will not be able to forget this website when they need to get a solution to a problem.

2. Instead of adding personnel to the force structure, change the current KM policies and procedures to aggregate or consolidate knowledge sources from all the disparate sources. Manage the procedures of the existing, overabundant knowledge sources and save the money that would be spent in personnel and facilities on more critical IT requirements. There is already too much output of knowledge for people to be able to routinely internalize it, which is why the Army wants to add KM personnel. But, adding more

personnel further stresses the already broken budget, requires more training for

personnel, and has the potential to further contribute to a bureaucracy.

3. Review the legacy, parochial knowledge forums, such as the Signal Corps' "Army

Communicator," to consolidate or aggregate the lessons learned and TTPs across the

DOTMLPF spectrum. Otherwise, this task is left to the same individuals who already

bear the burden of defending themselves and their country.

B. No consolidated, reliable repository for institutional knowledge of IT exists.

According to AR 25-1, this capability should have been caught by the AITR, but

it was either superseded or replaced by the APMS and there is more confusion than

guidance about this system. Additionally, the IT community's knowledge forums are

conspicuously nonexistent at the institutional KM organizations, the CALL and the

BCKS. Additionally, the parochial legacy knowledge forums and communications do not

coordinate with them, or each other. An example of this shortcoming is the Buckeye

system's latent exploitation. Developed in 1994 by the Corps of Engineers'

Topographical Engineering Center (TEC) for surveilling plant growth, today it

purportedly has a "zillion applications" (Miles 2006, 1). It was not discovered for a

decade until an OSD-level, IED Defeat, tiger team suggested it might be useful to help

save lives. Now it is highly praised by all DoD media sources. My recommendations to

these findings are:

In a similar fashion to the recommendations immediately above, and in concert

with the CALL and the existing legacy IT knowledge sources, provide an IT knowledge

repository that provides four things: a repository for IT related knowledge from all

parochial and institutional Army sources (e.g., LandWarNet and "Army

Communicator"); a portal to find information from commercial and government labs and organizations on equipment and capabilities that are publicly available (such as RDECOM, Amazon.com, and GCN); a controlled and analytical portal through which servicemen and women at all levels of war can acquire and evaluate (via threaded discussions or wiki-reviews) the latest technology developments and capabilities; and, the ability to aggregate this information or synthesize it for technology integration through the DOTMLPF system. This repository should also have a memorable IT Internet URL that links to the general consolidated KM site mentioned in 1A (1) above, such as "IT.army.mil" or "ITsolutions.army.mil." My case study investigations have found that this simple characteristic can be a significant factor to the success or demise of a website or web service in the commercial or governmental world--Amazon.com is a multi-billion dollar example of this.

C. Completely overhaul AR 25-1 to accurately reflect the current status of Army KM and IT repositories (i.e., APMS superseded or replaced the AITR years ago). Ideally, this concept would be superseded by the first recommendation, which would incorporate the APMS functionality. Additionally, there needs to be more emphasis and communication of this KM tool in places like the CIO/G-6's 500-day plan, AKO, and other websites. If the CIO/G-6 and AR 25-1 do not provide emphasis or guidance on a program (i.e., APMS), then it serves no one.

D. Army acquisition and development organizations do not consistently and proactively collaborate with each other or industry to identify capabilities and vulnerabilities of IT they acquire.

In keeping with previous recommendations, the Army and/or DoD need to establish a proactive IT capabilities and requirements evaluation working cell, that is easily accessible at a memorable URL, to harness the knowledge that exists across all of disparate DoD and commercial IT entities. The notion that simply attending technical conferences, such as FOSE or TechNet International, is satisfying this requirement is shameful and borders on misuse of funds. There is a wealth of IT information available and the time is long gone that the Army or DoD can sit back and wait for industry to come clamoring to them. The NSA's VAPED, the SDR forum, the WiMAX forum, GCN Labs and others previously cited are examples of readily available government and commercial IT knowledge sources that are not regularly engaged by the Army or the DoD. The enemy is exploiting our own technologies against us faster than we can develop new ones to defeat them, and at no overhead cost. The premiere example of the failure to exploit relevant and available information is the contemporary MIC that is the multi-billion dollar JTRS program.

Since its initiation in 1997, the JTRS has survived multiple Congressional reviews, a total restructuring, GAO reports, and countless negative publicity. I have personally attended SDR Forum conferences in the past, surrounded by scores of anxious SDR contractors, and observed the sheer confusion and frustration of the commercial world with the JTRS design requirements. All the while, a 2004 Naval Postgraduate School (NPS) thesis reveled that with some adaptation, the IEEE 802.16 standard would be able to meet all of the requirements of the JTRS waveforms. Additionally, Adaptix Corporation (www.adaptix.com/products.asp) has since developed an 802.16-based, SDR that, with some adaptations, probably meets a lot of the JTRS's requirements at a fraction

of the cost. The lessons of this system's development have been compared to that of the government's Ada language from the 1970s (Chapin, 2006, 1) and are reminiscent to the $6.7 billion SGT York of the 1980s. The Army cannot afford to keep relearning the same lessons every decade. Additionally, in conducting a report of smart antennas for the JTRS program, I discovered that the Air Force and Navy research labs are very familiar with and engaged in finding a solution. There was also a discussion of this technology at the SDR Forums conference, but no one from the JTRS was pursuing the information. Knowledge is most useful when it is shared collectively, and the Army is missing more than it can afford to miss.

E. None of the IT acquisition organizations in the Army (e.g., ITEC4 or ASCP) or DoD coordinate with the research and engineering development offices and organizations, such as RDECOM, the Army Test and Evaluation Command (ATEC), the TEC, for lessons learned and capabilities (e.g., Buckeye system, IEEE 802.16, wireless PDAs).

Policy needs to be implemented that requires the Army research and development organizations to collaborate with the reset of the DoD and the IT acquisition community, and vice versa. A lot of requirements development goes missing and billions are spent on IT items without any knowledge whether they meet the requirement or not. In addition to my findings in chapter 4, this is the subject of several GAO reports. The Army can no longer afford these unrefined and wasteful, cold war era practices.

F. No knowledge center exists of COTS and GOTS IT to provide vendors' recommendations, capabilities and limitations, best practices, recommendations, support or warranty information, or discounts to the warfighters and units that need it.

In keeping with previous recommendations, the Army needs to establish a secure consumer advocacy web portal. In many cases, Google.com is still the first resort for many officers and soldiers to get answers about IT. A military-sponsored, IT KM web service would afford servicemen and women the latest information, discounts, and warranty support on the most practical and best IT, such as CAC readers, commercial GPSs, specialized watches, and the latest PDAs. The ASCP website currently provides some vendor discount codes for CAC readers and computers, but does not provide (publicly available) recommendations for capabilities, requirements, or reliability. This capability should be coordinated with vulnerability research (see previous recommendations) from entities like the VAPED (NSA) and DARPA, to ensure that items that might be foreign made items do not have imbedded software or vulnerabilities. G. The Army and the DoD spend much more than industry on the web services it provides.

"Work smarter, not harder." The Army and DoD need to be smarter about the latest KM web services and employing contractors to manage their capabilities. In my interviews, the BCKS was described to me as a "shoestring" operation, but yet BaseOps.net provides web services that neither the CALL nor BCKS offer. If a $10 million program is "shoestring," then BaseOps.net is a "micro-fiber" operation at $200. The Army and DoD need to find a way to keep up with the latest developments that would allow a website like BaseOps.net to provide web services that the CALL and the BCKS do not, at tenths and thousandths of a percent of the cost. Just as the findings and recommendations above point out taking a proactive approach to managing IT knowledge, KM tools are also improving at record paces. Instead of passively observing

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software salesmen, the KM institutions need to actively pursue the latest practices and software to exploit new efficiencies in technology.

Additionally, BaseOps.net does not pay contractors millions of dollars to facilitate and monitor its threaded discussions. Instead they carefully select or nominate trusted senior active duty professionals, with working contemporary knowledge and passion for the subject matter, to facilitate and manage the content of their forums. This not only serves those content managers professionally, but also saves the Army and/or DoD millions in contracted personnel and facilities.

<div align="center">IT acquisition (tax stewardship)</div>

The accounting systems for IT acquisitions only exist at the strategic or enterprise level.

In keeping with previous recommendations, a secure Amazon.com-like web portal for broad personal and unit IT acquisition, at and below the operational level, needs to be established. My research shows that no accounting system exists to aggregate micro- and personal purchases of *all* COTS and GOTS IT products (e.g., GPSs, police scanners, handheld jammers, laptops, wireless routers, CAC readers, and ruggedized PDAs). No single source of COTS and GOTS IT exists either, to provide economies of scale down to the tactical or transactional level. If individuals and units know the Army is supporting them for their technology solutions and it will save them time and money, by conducting multiple searches and shopping around for the best price, then they will migrate there for good. This could easily and quickly be done by initially establishing an association with Amazon.com, with active support and reviews of the pertinent technologies, and then advertising this site to the fighting force. Once requirement

development and predictions, economies of scale, and consolidated buys become evident, then a mature system or portal, like the ISSPA for COMSEC, could be a permanent solution.

This capability would afford the Army and DoD accounting management, requirements development, and capability assessment for all IT purchases, down to the lowest level. A 2006 Naval Postgraduate School thesis states that "The DoD should develop and adopt a next evolution eProcurement system which . . . should replace the current Procurement Desktop-Defense (PDD) contract writing system" (Burris 2006, 78). Additionally, he found that "while the integration of legacy systems is possible using standard commercial technologies, they are too cost prohibitive to be considered reasonable" (Burris 2006, 77). This is why I recommend that a secure Amazon.com-like solution be implemented initially. This would afford the Army and/or DoD some measure of immediate and reliable control (via policy), insight, support, cost prediction, and requirements development of the capabilities soldiers and officers are buying with personal and unit funds. The ultimate goal of this transformation in acquisition would be to aggregate requirements into consolidated buys and economies of scale where possible, just as the ISSPA program currently does for COMSEC items. At a minimum, the leadership would have some visibility and control of what commercial IT products have infiltrated their organizations and cost the taxpayer.

IT integration (requirements development):

Develop a common operating picture for Army and DoD IT development, acquisition and integration.

The potential for or existence of redundancy of effort (intellectual or fiscal, or both) in the Army is very high. The ITEC4 is purchasing IT that should fall into the mission of the ASCP. RDECOM is potentially developing capabilities that ITEC4 or ASCP are already acquiring commercially, and the mission of the ARCIC sounds very much like one of the goals of the OPM EI. As I have found in my research and multiple GAO reports have been reporting, there is no direct coordination among acquisition and development organizations to really know what is being developed versus acquired to meet the warfighters' needs. The ASCP and ITEC4 do not feed into the DOTMLPF system, there is no IT KM repository at the CALL or BCKS, and research or development organizations do not directly collaborate with the IT acquisition programs. There needs to be an Army-wide deconfliction of missions for the various acquisition and development organizations, projects, and programs in the Army.

Be more honest and accurate about the true role of the acquisition and integration functions of the various IT development, acquisition and integration organizations in the Army.

The ASCP is supposedly the Army's commercial center of excellence and number one source of all IT, but this is not true. They provide a limited niche of networking hardware and software only at the enterprise level. Conversely, ITEC4 has implemented some strategic-sourcing initiatives to acquire IT that falls outside the mission of the Army's "number one source of all IT," such as PDAs and cell phones. Additionally, neither one of these entities offer any direct purchase mechanisms and economies of scale (strategic-sourcing) for ubiquitous IT requirements for work and home, such as CAC

readers and broadband wireless capabilities (that have already been proven in combat) (Parsons 2006, 8).

The strategic (enterprise) level acquisition systems that exist do not currently feed into the DOTMLPF system for the institutionalization of requirements and integration of IT capabilities in the Army or DoD.

In correlation with the recommendations above, but relevant to requirements development, current and future acquisition systems need to feed into the DOTMLPF system for the institutionalization of requirements and integration of IT capabilities. Two significant examples of technologies have evaded institutional knowledge, lessons learned or the DOTMLPF systems are IEEE 802.16 and the Buckeye system. An existing program that serves as a very effective model is the ISSPA at NETCOM for COMSEC. This program provides the Army all the pertinent information to analyze trends and make predictions.

No transactional (tactical and operational) level, Amazon.com-like acquisition system exists to provide insight of unit and individual micropurchases or personal purchases.

Soldiers and units routinely purchase IT outside of the current encumbered IT acquisition processes because it is not available to them. As mentioned in previous recommendations, but with respect to requirements development, there needs to be a mechanism for managing IT acquisition at all levels of war. Major Burris recommends in his NPS thesis that "the DoD should develop and adopt a next evolution eProcurement system which . . . should replace the current Procurement Desktop-Defense (PDD) contract writing system" (Burris 2006, 78). Again, this functionality could be provided

quickly and cheaply by simply establishing a secure portal which is an associate of Amazon.com to provide screened IT capabilities to the warfighters and units that would otherwise purchase it by whatever means is available.

None of the IT acquisition organizations in the Army or DoD coordinate with the research and engineering development offices and organizations.

Also, as mentioned above, but with specific respect to requirements development, current and future acquisition systems and communities need to be coordinating purchases and collaborating on acquisition trends with the research and development organizations. The pace of technology development has so outpaced even the latest acquisition programs, that the Army's NETCOM has started skipping the "type classification" processes in some of its critical IT purchases. Major contracting entities and programs in the Army and DoD, such as the ASCP and ITEC 4, need to coordinate and collaborate with the research and development, such as RDECOM, ARL, the ATEC, the TEC, for requirements development synergies (e.g., Buckeye system, IEEE 802.16, smart antenna technologies).

For Further Study

There are a few items that arose during my analysis that could use some further study. They are ancillary topics that relate to the implications of the rapid pace IT development, IT acquisition, and the KM IT and its acquisition in the Army and DoD.

Unanswered Questions

I sufficiently answered all of the questions that I posed in my methodology in chapter 3. However, several questions arose during my research that would likely serve the future of the Army and DoD in improving IT acquisition. They are:

What are the trends in and implications of skipping "type classification (TC)" process for IT acquisition? Generally speaking, TC is the process which provides a guide to authorization, procurement, logistical support, and asset and readiness reporting. It is the Army's implementation of the DoD financial management regulation requirement for a determination that an item is accepted for service use prior to spending procurement funds. The current guidance for TC can be found in AR 70-1 (Research, Development, and Acquisition, Army Acquisition Policy) as issued by Headquarters, Department of the Army on 31 December 2003.

What are the trades-off and challenges of implementing new KM personnel, versus transforming and enforcing KM policy and procedures?

<u>Things That Could Have Been Approached or Done Differently</u>

The primary thing that could have been done differently is the allocation of time to conduct my research of the various Army and DoD knowledge media sources. Two things contributed to the lack of time to finish researching my topic: the fundamental problem that KM in the Army and DoD is sprawling and piecemealed, and the Iraq Study Group (ISG) that our section was asked to perform. In addition to divulging this problem through the course of my research, our section (section 7) was pulled out of the regular CGSC curriculum to conduct a study of the latest situation in Iraq. This section study added roughly 20 class hours onto the already full 10-month curriculum and further stressed my time to dedicate here. I would have had more time to dedicate to this body, but in the end was very grateful for the lessons and education I gleaned from the ISG. I just wish I had a little more anticipation of additional requirements for the main course.

<center>Summary and Conclusions</center>

In summary, this chapter has outlined the findings from chapter 4 with recommendations for transforming the policies and procedures for current KM, acquisition, and KM of acquisition of IT in the Army and DoD. FM 1-0 states that "adaptive and determined leadership, innovative concept development and experimentation, and lessons learned from recent operations produce corresponding changes to [DOTMLPF] (United States 2005, 4-4)," but this assumes that KM mechanisms are present. For the eight findings of my research here, I have provided at least as many recommendations that do not require additional personnel, training, or equipping.

Transformational changes in policies and procedures for the KM of IT acquisition need to be implemented to leverage the best practices in industrial and commercial enterprises. Through research and findings, I have concluded that the pendulum of knowledge in the Army and DoD has nearly completed the counter-swing. It has swung almost completely opposite of the quiet, pre-Internet 1980s when the CALL was the solitary KM entity in DoD, to the point that no individual can possibly know where all the information outlets reside, much less synthesize it all. In fact, this is so much so that the Army has an interim FM on KM in production and plans to create KM positions to manage all the websites and automation tools across the Army. Unfortunately, adding another layer of personnel to the situation will not fix the problem, but only contribute to a bureaucracy with added fiscal, training, and staffing burdens. Just as the GAO recently pointed out and my research here found, the creation of the BTA has not produced any significant improvements in service-level acquisition stewardship and requirements

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development. I implore the Army leadership to take the above recommendations and move beyond incremental improvements to transformational changes and radical innovation (United States 2005, 4-10).

GLOSSARY

Acquisition Category (1D). Acquisition categories are established to facilitate
decentralized decision making and execution and compliance with statutorily
imposed requirements. The categories determine the level of review, decision
authority, and applicable procedures. ACAT 1D are major defense acquisition
programs (MDAP) for which the Milestone Decision Authority (MDA) is
USD(AT&L). The "D" refers to the Defense Acquisition Board (DAB), which
advises the USD(AT&L) at major decision points (DAU Glossary 2005).

Information Technology (IT). The online Joint Publication 1-02
(http://www.dtic.mil/doctrine/jel/ doddict/, accessed 25 NOV 06) does not define
information technology, but it does give a definition of an information system:
"(DoD) The entire infrastructure, organization, personnel, and components for the
collection, processing, storage, transmission, display, dissemination, and
disposition of information" (Joint Publication 1-02, "DoD Dictionary of Military
and Associated Terms. As amended through 08 August 2006). For the purposes of
this paper, I will define information technology as everything included in the
information system definition, except the organization and personnel.

Joint Tactical Radio System (JTRS). To develop, produce, integrate, and field a family of
interoperable, digital, modular, software-defined radios that operate as nodes in a
network to ensure secure wireless communications and networking services for
mobile and fixed forces. JTRS is critical to serving as the last tactical mile con-
necting the warfighter on the ground into the networking capabilities that are
delivered through the Global Information Grid (GIG). Under the newly revised
requirements, budget, and schedule established for the program, JTRS will
provide the mobile, ad hoc networking capability that is essential to realizing
DoD's transformational goals for the warfighter. (http://enterprise.spawar.navy.
mil/body.cfm?type=c&category=27&subcat=60, accessed 25 NOV 06)

Type Classification. (TC). TC is the Army's implementation of the DoD financial
management regulation requirement for a determination that an item is "accepted
for service use" prior to spending procurement funds (AR 70-1 2003, 8-2). TC is
basically the Army's "soldier proofing" test that is required for any item to get a
line item number (LIN) so that it is tracked and managed in both the acquisition
world and the supply world. This process provides a guide to authorization,
procurement, logistical support, and asset and readiness reporting. It solves some
problems (time to field and obsolescence) in the short term, but ultimately creates
a wasteland of replacement procedures and supply challenges. Without a LIN
number, the current supply programs, Standard Army Maintenance System--
Enhanced (SAMS-E), SSN-LIN Automated Management & Integrating System
(SLAMIS), and the Property Book Unit Supply Enhanced (PBUSE) are loathed to
follow the technology program transitions or track shortages and overages.

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